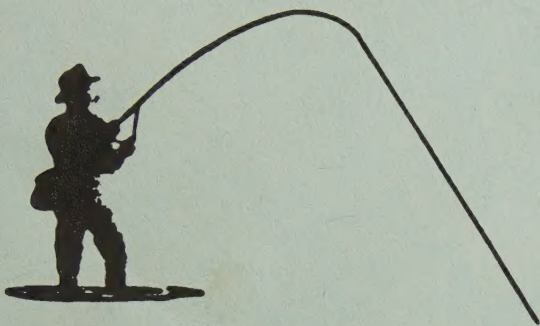


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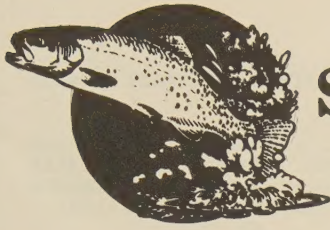
Roger Schoumacher, Editor

Editorial Section
U.S. Fish and Wildlife Service
Aylesworth Hall, CSU
Fort Collins, Colorado 80523

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Volume 30(4)

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AQUATIC PLANTS AND THEIR CONTROL

- 85-003049 Leslie, A. J., Jr. and G. J. Kobylinski. BENTHIC MACROINVERTEBRATE RESPONSE TO AQUATIC VEGETATION REMOVAL BY GRASS CARP IN NORTH-FLORIDA RESERVOIR. *Fla. Sci.* 48(4):220-231. 1985. SFA 30(4)
[Fla. Dep. Nat. Resour., 3900 Commonwealth Blvd., Tallahassee 32303]

- 85-003050 Stevenson, R. J.; R. Singer; D. A. Roberts and C. W. Boylen. PATTERNS OF EPIPELIC ALGAL ABUNDANCE WITH DEPTH, TROPHIC STATUS, AND ACIDITY IN POORLY BUFFERED NEW HAMPSHIRE LAKES. *Can. J. Fish. Aquatic Sci.* 42(9):1501-1512. 1985. In English with French summ. SFA 30(4)
[Dep. Biol., Univ. Louisville, Louisville, KY 40292]

GENERAL FISH CULTURE

- 85-003051 Jana, B. B. and G. N. Patel. DISTRIBUTION PATTERN OF SULPHATE REDUCING AND THIOSULPHATE OXIDIZING BACTERIAL POPULATIONS IN FISH PONDS OF DIFFERING FARMING MANagements. *Hydrobiologia* 127(2):171-186. 1985. SFA 30(4)
[Dep. Zool., Univ. Kalyani, Kalyani 741235, India]

TROUT AND SALMON CULTURE

- 85-003052 Choubert, G. and J. Blanc. FLESH COLOUR OF DIPLOID AND TRIPLOID RAINBOW TROUT (*SALMO GAIRDNERI* RICH.) FED CANTHAXANTHIN. *Aquaculture* 47(4):299-304. 1985. SFA 30(4)
[I.N.R.A., Stn. Rech. Hydrobiol., Saint Pée-sur-Nivelle, F 64310 Ascaïn, France]

- 85-003053 Craik, J. C. A. EGG QUALITY AND EGG PIGMENT CONTENT IN SALMONID FISHES. *Aquaculture* 47(1):61-88. 1985. SFA 30(4)
[Scot. Mar. Biol. Assoc., Dunstaffnage Mar. Res. Lab., P.O. Box 3, Oban, Argyll PA34 4AD, U.K.]

- 85-003054 Hansen, T. ARTIFICIAL HATCHING SUBSTRATE: EFFECT ON YOLK ABSORPTION, MORTALITY AND GROWTH DURING FIRST FEEDING OF SEA TROUT (*SALMO TRUTTA*). *Aquaculture* 46(4):275-285. 1985. SFA 30(4)
[Inst. Mar. Res., Dir. Fish. Matre Aquacult. Stn., 5198 Matredal, Norway]

- 85-003055 Hansen, T. J. and D. Møller. YOLK ABSORPTION, YOLK SAC CONSTRICTIONS, MORTALITY, AND GROWTH DURING FIRST FEEDING OF ATLANTIC SALMON (*SALMO SALAR*) INCUBATED ON ASTRO-TURF. *Can. J. Fish. Aquatic Sci.* 42(6):1073-1078. 1985. In English with French summ. SFA 30(4)
[Fish. Dir., Inst. Mar. Res., Div. Aquacult., Matre Aquacult. Stn., 5198 Matredal, Norway]

- 85-003056 Korzeniewski, K.; J. Trojanowski and C. Trojanowska. HYDROCHEMICAL STUDY OF LAKE SZCZYTNO MALE WITH TROUT CAGE CULTURE. *Pol. Arch. Hydrobiol.* 32(2):157-174. 1985. SFA 30(4)
[Dep. Chem., Inst. Biol., Pedagog. Univ., Arciszewskiego 22b, 76-200 Slupsk, Poland]

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85-003057 Trojanowski, J.; C. Trojanowska and H. Ratajczyk. PRIMARY PRODUCTION IN LAKES WITH CAGE TROUT CULTURE. *Pol. Arch. Hydrobiol.* 32(2):113-129. 1985. SFA 30(4)

[Dep. Chem., Inst. Biol., Pedagog. Univ., Arciszewskiego 22b, 76-200 Slupsk, Poland]

WARMWATER CULTURE

85-003058 Bezerra e Silva, J. W.; P. Fadul de Alencar; J. Orian Farias and M. Ines da Silva Nobre. [RESULTS OF POLYCULTURE OF CARP, *CYPRINUS CARPIO* L., 1758 VR. *SPECULARIS*, AND TAMBAQUI, *COLOSSOMA MACROPOMUM* CUVIER, 1818.] *Bol. Tec. Dep. Nac. Obras Contra Secas* 42(2):121-152. 1984. In Portuguese with English summ. SFA 30(4)

[Dir. Pesca Piscicult., 60.000, Fortaleza, Ceará, Brazil]

85-003059 Bezerra e Silva, J. W.; A. C. Sobrinho; F. R. Melo and F. M. Barros Filho. [RESULTS OF EXPERIMENTAL CULTIVATION OF CARP, *CYPRINUS CARPIO* L., 1758 VR. *SPECULARIS*, AT THE ICHTHYOLOGICAL RESEARCH STATION (PENTECOSTE, CEARÁ BRAZIL).] *Bol. Tec. Dep. Nac. Obras Contra Secas* 42(2):179-211. 1984. In Portuguese with English summ. SFA 30(4)

[Dir. Pesca Piscicult., 60.000, Fortaleza, Ceará, Brazil]

85-003060 Chang, W. Y. B. POND FISH CULTURE IN THE PEARL RIVER DELTA, CHINA. *Aquacult. Mag.* 11(4):45-46. 1985. SFA 30(4)

85-003061 Epler, P.; K. Bieniarz and M. Sokolowska. THE EFFECTS OF LOW DOSAGES OF STEROID HORMONES AND CARP HYPOPHYSIAL HOMOGENATE ON CARP (*CYPRINUS CARPIO*) OOCYTE MATURATION IN VITRO. *Aquaculture* 47(2-3):231-238. 1985. SFA 30(4)

[Dep. Ichthyobiol. Fish., Acad. Agric., Krakow-Mydlniki, Ambrosowa 6, Poland]

85-003062 Epler, P.; K. Bieniarz; W. Popek and J. Musialek. THE EFFECT OF SOLU-MEDROL (STEROID HORMONE) ON MATURATION OF CARP OVARIES IN VIVO. *Pol. Arch. Hydrobiol.* 32(2):195-202. 1985. SFA 30(4)

[Dep. Ichthyobiol. Fish., Agric. Acad. Cracow, 30-149 Kraków-Mydlniki, Ambrosowa 6, Poland] Solu-Medrol was injected into adult carp females divided into 4 groups: group 1 received this hormone in a dose of 1 mg/kg body weight at 10.00, group 2--2 mg/kg at 10.00, group 3--1 mg/kg at 20.00, and group 4--2 mg/kg at 20.00. After 24 h, females of all groups were administered 1 mg pituitary homogenate per kg body weight. Owing to injections of 1 mg pituitary homogenate per kg body weight, 74-87% of oocytes attained maturity. It was found that whereas Solu-Medrol does not influence the state of maturity of ovary, it induces a change in the circadian rhythm of secretion of estradiol (blood), and it seems to sensitize the ovary to the stimulatory action of pituitary gonadotropin.

85-003063 Hamman, R. L. INDUCED SPAWNING OF HATCHERY-REARED RAZORBACK SUCKER. *Prog. Fish-Cult.* 47(3):187-189. 1985. SFA 30(4)

[U.S. FWS, Dexter Natl. Fish Hatchery, P.O. Box 219, Dexter, NM 88230]

85-003064 Hojda, K. HERPON AND PERIPHYTIC ALGAE IN A CARP POND FERTILIZED WITH SUGAR FACTORY WASTES. 2. COMMUNITIES OF ALGAE. *Acta Hydrobiol.* 25/26(1):41-50. 1984. SFA 30(4)

WARMWATER CULTURE (CONTINUED)

85-003064 CONTINUED

[Polish Acad. Sci., Inst. Bot., Algolog. Lab., Lubicz 46, 31-512 Krakow, Poland]

85-003065 Hojda, K. HERPON AND PERIPHYTIC ALGAE IN A CARP POND FERTILIZED WITH SUGAR FACTORY WASTES. 1. SYSTEMATIC COMPOSITION. *Acta Hydrobiol.* 25/26(1):17-40. 1984. SFA 30(4)

[Polish Acad. Sci., Inst. Bot., Algolog. Lab., Lubicz 46, 31-512 Krakow, Poland]

85-003066 Hollerman, W. D. EFFECTS OF ANNUAL DRAINING ON WATER QUALITY IN FISH PONDS. *Ph.D. dissertation, Auburn Univ.* 59p. 1985. From Diss. Abstr. Int. B Sci. Eng. 46(2):421. 1985. SFA 30(4)

Research on water quality in channel catfish (*Ictalurus punctatus*) ponds and fertilized sportfish ponds has generally been limited to experimental ponds that are drained and refilled annually. Commercial channel catfish ponds are drained less frequently and private sportfish ponds are seldom drained. This study was conducted to determine the influence of annual draining on water quality of feed (56 kg/ha daily maximum) channel catfish ponds and regularly fertilized (9 kg P_2O_5 /ha per application) sunfish (*Lepomis macrochirus*) ponds.

Four channel catfish ponds and four sunfish ponds were drained annually, while equal numbers of ponds were not drained for three years. A number of water quality variables were measured frequently in the channel catfish ponds. Average concentrations of total phosphorus increased from year to year in undrained ponds. They were higher in undrained than in drained ponds during the second and third years of the study. However, phytoplankton abundance, as evident from chlorophyll *a* concentrations, did not differ between treatments during the three years. Thus, the accumulation of phosphorus in undrained ponds was unimportant to phytoplankton growth because the continuous input of phosphorus in feed was adequate to promote abundant phytoplankton growth even in drained ponds. Aside from total phosphorus, water quality was remarkably similar between treatments. The only difference in annual catfish production was related to a parasite infection of fish rather than water quality. The findings suggest that the recent trend in not draining channel catfish ponds at harvest will not lead to rapid deterioration of water quality in ponds. A number of water quality variables were also measured regularly in the sunfish ponds. Average concentrations of chlorophyll *a* and total phosphorus increased each year in undrained ponds, while remaining approximately the same each year in drained ponds. During the second and third years, chlorophyll *a* concentrations were greater in the undrained ponds than in the drained ponds. Concentrations of filtrable orthophosphate, total ammonia nitrogen, and nitrate-nitrogen did not differ between treatments. Muds of undrained ponds accumulated more phosphorus than did muds of drained ponds. The increase in phytoplankton production in undrained ponds, as evident from chlorophyll *a* values, was attributed to a greater availability of phosphorus from muds. These findings suggest that fertilization rates can be reduced in undrained sportfish ponds which have been regularly fertilized for several years.

85-003067 Jana, B. B.; G. Sarkar and G. Kindu. PATTERN OF PHYSICOCHEMICAL CHANGES IN THE WATER DURING HATCHING OF INDIAN CARP EGGS IN A CHINESE HATCHERY SYSTEM. *Aquaculture* 47(1):89-96. 1985. SFA 30(4)

[Dep. Zool., Univ. Kalyani, Kalyani 741235, West Bengal, India] Physicochemical changes in the water were monitored at different hours of embryonic and larval development of Indian carp (*Cirrhinus mrigala*) eggs in a Chinese hatchery system with 75-85% hatching success. At a water temperature of 29.3°C, mass hatching of the embryos started at about 11-12 h after fertilization and was completed within 4 h. The amount of dissolved oxygen and chemical oxygen demand ranged between 4.8 and 9.63 mg l^{-1} and 16.5 and 185.0 mg l^{-1} , respectively. A marked rise in the concentration of bicarbonate and total hardness of the water after egg

WARMWATER CULTURE (CONTINUED)

85-003067 CONTINUED transfer into hatching tanks was perhaps due to liberation of Ca^{2+} and Mg^{2+} from the egg mass. A sharp decline in phosphate content during hatching was associated with the building of bones, while the ammonia level was greatly increased due to a high rate of nitrogenous excretion during hatching.

85-003068 Lin, H.; C. Peng; L. Lu; X. Zhou; G. Van der Kraak and R. E. Peter. INDUCTION OF OVULATION IN THE LOACH (*PARAMISGURNUS DABRYANUS*) USING PIMOZIDE AND [D-ALA⁶, PRO³-N-ETHYLAMIDE]-LHRH. *Aquaculture* 46(4):333-340. 1985. SFA 30(4)

[Dep. Zool., Zhongshan Univ., Guangzhou, China]

85-003069 McGinty, A. S. EFFECTS OF PREDATION BY LARGEMOUTH BASS IN FISH PRODUCTION PONDS STOCKED WITH *TILAPIA NILOTICA*. *Aquaculture* 46(4):269-274. 1985. SFA 30(4)

[Dep. Mar. Sci., Univ. Puerto Rico, Mayaguez 00708]

85-003070 Moring, J. R. SMELT CULTURE. *Me. Fish Wildl.* 27(2):13-15. 1985. SFA 30(4)

[Me. Coop. Fish. Res. Inst, Orono]

85-003071 O'Grady, K. T. and P. B. Spillett. A COMPARISON OF THE POND CULTURE OF CARP, *CYPRINUS CARPIO* L., IN BRITAIN AND MAINLAND EUROPE. *J. Fish Biol.* 26(6):701-714. 1985. SFA 30(4)

[Water Res. Cent., Medmenham, P.O. Box 16, Marlow, Buckshire SL7 2HD, England]

85-003072 Opuszynski, K.; J. V. Shireman; F. J. Aldridge and R. Rottmann. INTENSIVE CULTURE OF GRASS CARP AND HYBRID GRASS CARP LARVAE. *J. Fish Biol.* 26(5):563-573. 1985. SFA 30(4)

[Inland Fish. Inst., Zabieniec, 05-500 Piaseczno, Poland]

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[Tex. Parks Wildl. Dep., 4200 Smith School Rd., Austin, TX 78744]

85-003074 Woods, L. C. III; J. H. Kerby and M. T. Huish. CULTURE OF HYBRID STRIPED BASS TO MARKETABLE SIZE IN CIRCULAR TANKS. *Prog. Fish-Cult.* 47(3):147-153. 1985. SFA 30(4)

[Baltimore Gas Elec., Crane Aquacult. Fac., P.O. Box 1475, Baltimore, MD 21203]

MARICULTURE

85-003075 Øiestad, V.; P. G. Kvenseth and A. Folkvord. MASS PRODUCTION OF ATLANTIC COD JUVENILES *GADUS MORHUA* IN A NORWEGIAN SALTWATER POND. *Trans. Am. Fish. Soc.* 114(4):590-595. 1985. SFA 30(4)

[Inst. Mar. Res., N-5011 Nordnes-Bergen, Norway]

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[La. Dep. Environ. Qual., Off. Water Resour., 3945 North I-10 Service Rd. West, Metairie, CA 70002]

85-003077 Harvey, B.; J. Nacario; L. W. Crim; J. V. Juario; and C. L. Marte. INDUCED SPAWNING OF SEA BASS, *LATES CALCARIFER*, AND RABBITFISH, *SIGANUS GUTTATUS*, AFTER IMPLANTATION OF PELLETTED LHRH ANALOGUE. *Aquaculture* 47(1):53-59. 1985. SFA 30(4)

[Dep. Biol., Univ. Victoria, P.O. Box 1700, Victoria, BC V8W 2Y2, Canada]

85-003078 Kadmon, G.; H. Gordin and Z. Yaron. BREEDING-RELATED GROWTH OF CAPTIVE *SPARUS AURATA* (TELEOSTEI, PERCIFORMES). *Aquaculture* 46(4):299-305. 1985. SFA 30(4)

[Dep. Zool., Geo. S. Wise Fac. Life Sci., Tel Aviv Univ., Tel Aviv 69978, Israel]

85-003079 Kerby, J. H.; J. D. Bayless and R. M. Harrell. GROWTH, SURVIVAL, AND HARVEST OF STRIPED BASS PRODUCED WITH CRYOPRESERVED SPERMATOOA. *Trans. Am. Fish. Soc.* 114(5):761-765. 1985. SFA 30(4)

[N.C. Coop. Fish. Res. Unit, Dep. Zool., N.C. State Univ., Campus Box 7617, Raleigh 27695]

FEEDS, FEEDING, AND NUTRITION

85-003080 Dabrowski, K.; S. J. Kaushik; B. Fauconneau. REARING OF STURGEON (*ACIPENSER BAERI* BRANDT) LARVAE. I. FEEDING TRIAL. *Aquaculture* 47(2-3):185-192. 1985. SFA 30(4)

[Lab. Nutr. Elevage Poissons, I.N.R.A., Saint Pée-sur-Nivelle, 64310 Ascaïn, France]

85-003081 De Silva, S. S. and M. K. Perera. EFFECTS OF DIETARY PROTEIN LEVEL ON GROWTH, FOOD CONVERSION, AND PROTEIN USE IN YOUNG *TILAPIA NILOTICA* AT FOUR SALINITIES. *Trans. Am. Fish. Soc.* 114(4):584-589. 1985. SFA 30(3)

[Dep. Zool., Univ. Ruhuma, Sri Lanka, Matura, Sri Lanka]

85-003082 Hajra, A. BIOCHEMICAL EVALUATION OF COMMON LAND GRASS AS FEED FOR GRASS CARP, *CTENOPHARYNGODON IDELLA* (VAL.), IN THE TROPICS. *Aquaculture* 47(4):293-298. 1985. SFA 30(4)

[Biochem. Discipline, Cent. Inland Fish. Res. Inst., Barrackpore-743101, West Bengal, India]

85-003083 Higgs, D. A.; J. R. Markert; M. D. Plotnikoff; J. R. McBride and B. S. Dosanjh. DEVELOPMENT OF NUTRITIONAL AND ENVIRONMENTAL STRATEGIES FOR MAXIMIZING THE GROWTH AND SURVIVAL OF JUVENILE PINK SALMON (*ONCORHYNCHUS GORBUSCHA*). *Aquaculture* 47(2-3):113-130. 1985. SFA 30(4)

[Dep. Fish. Oceans, West Vancouver Lab., 4160 Marine Dr., West Vancouver, BC V7V 1N6, Canada]

FEEDS, FEEDING, AND NUTRITION (CONTINUED)

85-003084 Hughes, S. G. EVALUATION OF GLUTAMIC ACID AND GLYCINE AS SOURCES OF NONESSENTIAL AMINO ACIDS FOR LAKE TROUT (*SALVELINUS NAMAYCUSH*) AND RAINBOW TROUT (*SALMO GAIRDNERII*). *Comp. Biochem. Physiol. A Comp. Physiol.* 81(3):669-671. 1985. SFA 30(4)

[U.S. FWS, Tunison Lab. Fish Nutr., 28 Gracie Rd., Cortland, NY 13045] A semi-purified test diet which contained either glutamic acid or glycine as the major source of nonessential amino acids (NEAA) was fed to lake and rainbow trout. Trout fed the diet containing glutamic acid consistently showed better growth and feed conversion efficiencies than those fed the diets containing glycine. The data indicate that these trout utilize glutamic acid more efficiently than glycine when no other major sources of NEAA are present.

85-003085 March, B. E.; C. Macmillan and F. W. Ming. TECHNIQUES FOR EVALUATION OF DIETARY PROTEIN QUALITY FOR THE RAINBOW TROUT (*SALMO GAIRDNERI*). *Aquaculture* 47(4):275-292. 1985. SFA 30(4)

[Dep. Poultry Sci., Univ. British Columbia, Vancouver, BC V6T 2A2, Canada]

85-003086 Medland, T. E. and F. W. H. Beamish. THE INFLUENCE OF DIET AND FISH DENSITY ON APPARENT HEAT INCREMENT IN RAINBOW TROUT, *SALMO GAIRDNERI*. *Aquaculture* 47(1):1-10. 1985. SFA 30(4)

[Dep. Zool., Univ. Guelph, Guelph, ON N1G 2W1, Canada] Rainbow trout were held in densities of 15, 35 or 50 fish per tank (2.48-8.27 kg M⁻³) and fed one of six balanced diets varying in protein (34%, 48%, 58%) and lipid levels (7%, 23%). The elevation in oxygen consumption following feeding was attributed to apparent heat increment. Apparent heat increment tended to increase with dietary protein for each of the two lipid levels within each density of fish. A significant change in apparent heat increment relative to digestible energy was not demonstrable with dietary protein for each lipid level and fish density. When dietary lipid was high, the fraction of energy lost through apparent heat increment was improved and tended to decrease with dietary protein. Thus, a decrease in dietary protein with a concomitant increase in lipid provides for a more efficient utilization of dietary protein for growth. Apparent heat increment varied directly with rainbow trout density on the basis of equivalent weights and diets.

85-003087 Otubusin, S. O. and C. Lim. THE EFFECT OF DURATION OF FEEDING ON SURVIVAL, GROWTH AND PRODUCTION OF MILKFISH, *CHANOS CHANOS* (FORSKAL), IN BRACKISHWATER PONDS IN THE PHILIPPINES. *Aquaculture* 46(4):287-292. 1985. SFA 30(4)

[Coll. Fish., Univ. Philippines, Oloilo City, Philippines] Milkfish (*Chanos chanos*) fingerlings with an average weight of 16.3 g were stocked at 4000 per ha in twelve 500-m² experimental brackishwater ponds. The duration of supplementary feeding using pelletized chick starter (21.15% protein) at a ration of 5% of the biomass, was varied between 0 and 3 months. The duration of supplementary feeding had no significant effect on the survival, growth and production of milkfish. The results indicated that supplementary feeding of milkfish was not necessary at the stocking level of 4000 fish/ha, when adequate pond fertilization was carried out.

85-003088 Parsons, T. R.; J. C. Sharp and W. K. W. Li. THE CULTIVATION OF MARINE AMPHIPODS AND THEIR USE AS FOOD FOR YOUNG SALMONIDS. *J. Appl. Ichthyol.* 1(2):77-84. 1985. In English with French and German summ. SFA 30(4)

[Dep. Oceanogr., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada] Populations of the amphipod, *Anisogammarus pugettensis* (Dana) 1853, can be raised for several generations under laboratory conditions. Compared with the growth of another amphipod, *Eogammarus confervicolus* Stimpson 1856, *A. pugettensis* grew more rapidly to maximum biomass and reached a new generation earlier when both were grown under their optimal growth conditions. *A. pugettensis* grew faster in upwelled impoundments containing epiphytic diatoms than under laboratory conditions. In fish

SPORT FISHERY ABSTRACTS

FEEDS, FEEDING, AND NUTRITION (CONTINUED)

85-003088 CONTINUED feeding studies, the amphipod *E. confervicolus* is an adequate diet for salmonid growth when compared with Oregon moist pellets.

85-003089 Santiago, C. B.; M. B. Aldaba; E. F. Abuan and M. A. Laron. THE EFFECTS OF ARTIFICIAL DIETS ON FRY PRODUCTION AND GROWTH OF *OREOCHROMIS NILOTCUS* BREEDERS. *Aquaculture* 47(2-3):193-203. 1985. SFA 30(4)

[Aquacult. Dep., SEAFDEC, Binangonan Res. Stn., Binangonan, Rizal, Philippines]

85-003090 Schauer, P. S. and K. L. Simpson. BIOACCUMULATION AND BIOCONVERSION OF DIETARY LABELED FATTY ACIDS IN *ARTEMIA* AND WINTER FLOUNDER (*PSEUDOPLEURONCTES AMERICANUS*). *Can. J. Fish. Aquatic Sci.* 42(8):1430-1438. 1985. In English with French summ. SFA 30(4)

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85-003282 CONTINUED $\log P_{50}/\Delta pH = -0.74$. Blood from capture-stressed mako sharks did not show either a Root effect or a significant Bohr effect ($\Delta \log P_{50}/\Delta pH = +0.16$). The O_2 -affinity constant, P_{50} , was 10.6 mmHg at pH 7.6 and 25°C. Hematological measurements following capture gave hematocrit values of $24.2 \pm 8.1\%$ and $32.3 \pm 10.8\%$ for marlin and mako respectively, and high concentrations of blood lactate in both species ($15-16 \text{ mmol l}^{-1}$). The O_2 transport properties of the blood are discussed in relation to oxygen demand and capture stress.

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GENETICS, VARIATION STUDIES AND HYBRIDIZATION

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[Dep. Zool., Univ. Mont., Missoula 59812] We examined the developmental rate of hybrids between rainbow trout (*Salmo gairdneri*) and two subspecies of cutthroat trout: westslope cutthroat trout (*Salmo clarki lewisi*) and Yellowstone cutthroat trout (*Salmo clarki bouvieri*). These taxa show considerable genetic divergence at 42 structural loci encoding enzymes; the mean Nei's D between the rainbow trout and the two species of cutthroat trout is 0.22. We used four measures of developmental rate; time of hatching and yolk resorption, rate of increase in activity of four enzymes, and time of initial detection of seven isozyme loci. The two cutthroat trout subspecies reached hatching and yolk resorption earlier than rainbow trout. Cutthroat trout had higher relative enzyme activities than rainbow trout from deposition of eye pigment to hatching. There was no difference in the rate of increase in enzyme activity or time of initial expression of these loci between these species. Hybrids showed developmental rates intermediate or similar to that of the parental species using all measures. Our results indicate an absence of regulatory and developmental incompatibility between these taxa.

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[Dep. Zool., Univ. Ark., Fayetteville 72701] Grass carp, acclimated at 24°C, were tested for temperature preference in a laboratory, horizontal gradient tank. After a 6-day period of exploration the grass carp gravitated to a final thermal preferendum of 35°C. In the temperature tolerance test the ultimate upper incipient lethal temperature (TL50), was estimated as 41.5°C. The results are compared to those of a similar study with hybrid carp (female grass carp x male bighead carp).

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[Biol. Fac., Moscow State Univ., Moscow, USSR] The effect of different concentrations of intraspecific chemical stimuli on the intensity of response was studied in male and female threespine sticklebacks, *Gasterosteus aculeatus*. The experimental males displayed aggressive behavior toward the odor of fish of the same sex, which was accompanied by avoidance of the compartment containing the stimulus. In female sticklebacks, water from fish of the same sex caused attraction to the source of stimulus. High intensity signals depressed the aggressive response of male sticklebacks and caused avoidance of the compartment with stimulus by females. Olfaction plays the leading role in the perception of the intraspecific chemical signals by threespine sticklebacks.

85-003324 Hanson, C. H. and E. Jacobson. ORIENTATION OF JUVENILE CHINOOK SALMON, *ONCORHYNCHUS TSHAWYTSCHA*, AND BLUEGILL, *LEPOMIS MACROCHIRUS*, TO LOW WATER VELOCITIES UNDER HIGH AND LOW LIGHT LEVELS. *Calif. Fish Game* 71(2):110-113. 1985. SFA 30(4)

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85-003326 CONTINUED circumstantial evidence suggest that striped mullet, *Mugil cephalus*, use the upper posterior portion of the pharynx for aerial respiration, the air obtained either by jumping, rolling, or holding the head above the water and moving the air into the upper pharyngeal chamber. The principle evidence is that jumping frequencies are inversely correlated with dissolved oxygen concentration, and that the pharyngobranchial organ is capable of holding gas.

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[Dep. Zoophysiol., Uppsala Univ., Box 560, S-751 22 Uppsala, Sweden] Attraction of fry of Arctic char [*Salvelinus alpinus* (L.)] to water conditioned by conspecifics of the same age was studied in a Y-maze fluvium. Two types of experiments were run. In "up-swimming tests" (1), starting from the common leg of the Y-maze, a single fish was given the choice of entering one of the two upstream arms. In "gradient tests" (2), the momentary positions of a single char were time-lapse photographed in a test yard of this common shank. Strong attraction to conditioned water was observed in both types of tests.

85-003339 Reeves, G. H. INTERACTION AND BEHAVIOR OF THE REDSIDE SHINER (*RICHARDSONIUS BALTEATUS*) AND THE STEELHEAD TROUT (*SALMO GAIARDNERI*) IN WESTERN OREGON: THE INFLUENCE OF WATER TEMPERATURE. *Ph.D. dissertation, Oreg. State Univ.* 109p. 1984. From Diss. Abstr. Int. B Sci. Eng. 46(2):372. 1985. SFA 30(4)

Water temperature influenced interactions between reddsides and juvenile steelhead trout ($\geq 1+$) in the field and the laboratory. Distribution of the two species within various habitats was determined in three streams with different water temperature regimes. The range of habitats occupied by trout in allopatry at cool temperatures and at intermediate temperatures in sympatry was similar but habitats occupied by shiners in allopatry at warm temperatures and in sympatry at intermediate temperatures differed. Shiners at warm temperatures in allopatry inhabited areas of intermediate depth and high velocity, similar to those inhabited by trout in the other streams. In the presence of trout at intermediate temperatures, shiners were found in deep, slow water. Water temperature and the presence of the other species influenced production, activity, and distribution of both trout and shiners in laboratory streams. Trout dominated at cool temperatures (12-15°C) and shiners prevailed at warm temperatures (19-22°C). The reddsides exhibited two basic social organizations, loose aggregations and defense of an area. The type of organization observed varied with water temperature, abundance of food, and presence or absence of juvenile steelhead trout. The behavioral repertoire of the reddsides was diverse. Size of the individual and proprietorship of an area were important in determining outcomes of interactions. Intensity of individual encounters varied with conditions in the laboratory streams. Plasticity of its social behavior appears to contribute to the ecological success of the reddsides.

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85-003385 Zale, A. V. APPLIED ASPECTS OF THE THERMAL BIOLOGY, ECOLOGY, AND LIFE HISTORY OF THE BLUE TILAPIA, *TILAPIA AUREA* (PISCES: CICHLIDAE). *Ph.D. dissertation, Univ. Fla.* 247p. 1984. From Diss. Abstr. Int. B Sci. Eng. 46(3):745. 1985. SFA 30(4)

Laboratory and field research was conducted on issues relevant to the effective management of the blue tilapia, *Tilapia aurea*, an exotic cichlid established in U.S. waters. Cold tolerance of blue tilapia was enhanced at isosmotic salinities. Time and temperature interacted to elicit cold death; a model was developed to quantify this interaction. Considerable heterogeneity in thermal tolerance among individual fish was observed. Blue tilapia moved in and out of a stenothermal spring run in direct response to seasonal changes in surface-water temperatures. Survival, growth, and relative foraging abilities of early life history stages of blue tilapia exceeded those of larvae of a representative native centrarchid in laboratory experiments. The success of the blue tilapia in colonizing systems and rapidly achieving high abundances may be a result of this high relative proficiency in exploiting available trophic resources. In Lake George, young tilapia fed primarily on microcrustaceans and exhibited a high degree of trophic overlap with larval shad. In laboratory electivity experiments, largemouth bass offered juvenile blue tilapia and bluegill of equal size exhibited a preference for tilapia as forage. Nest-site selection by blue tilapia was characterized in a stenothermal spring run and compared to historical data on largemouth bass nesting in the run prior to the presence of tilapia. Blue tilapia preferentially selected nest sites in vegetated, shallow-water areas; microhabitat characteristics corresponded to those formerly used by largemouth bass. Because nesting by largemouth bass is behaviorally suppressed under crowded conditions, the presence of nesting tilapia may have been responsible for an observed decline in number of bass nests in the run. Blue tilapia in the Silver Glen Springs Run/Lake George system spawned from March through June although nesting in the stenothermal run was initiated in late December. Gonadal recrudescence was correlated with increasing photoperiod. Fecundity estimates ranged as high as 8599. Maximum estimated age of blue tilapia

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LIFE HISTORY-GENERAL WORKS (CONTINUED)

85-003385 CONTINUED in this system was 4+ years. Growth was rapid; estimated total lengths at ages I, II, III, and IV were 280, 359, 397, and 423 mm, respectively. Scale rings of males were unreliable annuli.

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC.

85-003386 Anderson, C. S. THE STRUCTURE OF SCULPIN POPULATIONS ALONG A STREAM SIZE GRADIENT. *Environ. Biol. Fishes* 13(2):93-102. 1985. SFA 30(4)

[Mus. Zool., Univ. Mich., Ann Arbor 48109] Data on spatial variation of sculpin density, growth and fecundity support the hypothesis that populations of stream fish are structured by changes in risk of predation and prey availability along a gradient in stream size. *Cottus bairdi* in warm streams and *C. cognatus* in cold streams exhibit similar patterns. Sculpins in large streams have faster individual growth rates at higher fecundities than those in small streams, but occur at lower density. The patterns appear to be persistent and suggest that predation reduces sculpin density in larger streams. Competitive release, variations in prey productivity, and local factors probably contribute to the variation in sculpin growth.

85-003387 Bryant, W. C. STATUS OF THE WALLEYE IN MICHIGAN WATERS OF LAKE ERIE AND CONNECTING WATERS, 1980-1983. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1918. 30p. 1984. SFA 30(4)

85-003388 Chernoff, B. POPULATION DYNAMICS OF THE DEVILS HOLE PUFFFISH. *Environ. Biol. Fishes* 13(2):139-147. 1985. SFA 30(4)

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85-003390 Crowder, L. B. INDICATORS OF THE STATUS OF COLD WATER PREDATOR-PREY SYSTEMS. *Great Lakes Fish. Comm. Spec. Publ.* 85-3. p. 99-106. 1985. SFA 30(4)

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[Mo. Dep. Conserv., 1110 College Ave., Columbia 65201]

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85-003393 Koziol, A. M. DYNAMICS OF LIGHTLY EXPLOITED POPULATIONS OF THE LAKE WHITEFISH, ISLE ROYALE VICINITY, LAKE SUPERIOR. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1911. 36p. 1982. SFA 30(4)

POPULATION STUDIES, PRODUCTION, RECRUITMENT, ETC. (CONTINUED)

85-003394 Libosvářsky, J. and D. W. Saeed. BIOMETRICS AND POPULATION BREAKDOWN IN ROACH. *Acta Sci. Nat. Acad. Sci. Bohemoslov. BRNO Nov. Ser.* 18(11):3-44. 1984. SFA 30(4)

85-003395 Lyons, J. WALLEYE PREDATION, YELLOW PERCH ABUNDANCE, AND THE POPULATION DYNAMICS OF AN ASSEMBLAGE OF LITTORAL-ZONE FISHES IN SPARKLING LAKE, WISCONSIN. *Ph.D. dissertation, Univ. Wis.* 205p. 1984. From Diss. Abstr. Int. B Sci. Eng. 46(2):407. 1985. SFA 30(4)

Piscivory by walleyes (*Stizostedion vitreum*) may be important in structuring fish populations. I used a bioenergetic model to quantify the impact of walleye predation on an assemblage of littoral-zone fishes in Sparkling Lake, a small, moderately productive lake in northern Wisconsin, and to assess the influence of large yellow perch (*Perca flavescens*) year classes on walleye predation effects. The most numerous small littoral-zone fishes in Sparkling Lake were minnows (primarily *Pimephales notatus*, and *Notropis volucellus*), darters (*Etheostoma exile*, *E. nigrum*, and *Percina caprodes*), and perch. Abundance of young-of-the-year (YOY) perch varied among years; many were present in 1981 and 1983 but few were present in 1982. Juvenile walleyes were common, but adults were scarce, possibly owing to muskellunge (*Esox masquinongy*) predation. Walleye diet was influenced by the abundance and growth rates of YOY perch. In 1981 YOY perch were abundant but also fast growing, and most were too large to be eaten by small walleyes. In 1982 YOY perch were scarce and walleyes ate many minnows and darters. In 1983 YOY perch were again abundant but also slow growing. They dominated the diets of all sizes of walleyes, and few minnows or darters were eaten after YOY perch became available in early summer. In laboratory experiments walleyes preferred minnows over YOY perch and avoided darters. Walleye predation had greater effects on the population dynamics of darters than minnows. In 1982, when YOY perch were uncommon, walleye consumption accounted for the entire decline in adult darter numbers and most of the decline in adult minnows. In 1983 when YOY perch were common, walleye consumption of minnows and darters was reduced. Walleye predation still accounted for nearly all of adult darter mortality, but only about one third of adult minnow mortality. Adult darter survival improved, and YOY abundance was higher than in 1982, indicating that the large 1983 perch year class buffered darter populations from the effects of walleye predation. However, adult minnow survival declined, and YOY abundance was lower than in 1982, indicating that reductions in walleye consumption did not result in increased minnow abundance.

85-003396 Monteleone, D. M.; W. T. Peterson and G. C. Williams. INTERANNUAL FLUCTUATIONS IN DENSITY OF SAND LANCE, *AMMODYTES AMERICANUS*, LARVAE IN LONG ISLAND SOUND. *Estuaries* 8(2B):101A. 1985. Abstract only. SFA 30(4)
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85-003397 Muth, K. M. INDICATORS OF CHANGES IN PREDATOR AND PREY POPULATIONS IN WESTERN LAKE ERIE. *Great Lakes Fish. Comm. Spec. Publ.* 85-3. p. 107-118. 1985. SFA 30(4)
[U.S. FWS, Sandusky Biol. Stn., Sandusky, OH 44820]

85-003398 Pribyl, S. P. and W. E. Hosford. MALHEUR BASIN WILD TROUT EVALUATION. *Oreg. Dep. Fish Wildl. Fish Div. Inf. Rep.* No. 85-5. ii+23p. 1985. SFA 30(4)
[Oreg. Dep. Fish Wildl., Hines]

85-003399 Rybicki, R. W. LAKE TROUT POPULATIONS IN MICHIGAN WATERS OF LAKE MICHIGAN, 1976-1982. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1914. 37p. 1983. SFA 30(4)

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[Dep. Biol., Univ. Calif., Los Angeles 90024]

85-003401 Selgeby, J. H. POPULATION TRENDS OF LAKE HERRING (*COREGONUS ARTEDII*) AND RAINBOW SMELT (*OSMERUS MORDAX*) IN U.S. WATERS OF LAKE SUPERIOR, 1968-84. *Great Lakes Fish. Comm. Spec. Publ.* 85-3. p. 1-12. 1985. SFA 30(4)
[U.S. FWS, Ashland Biol. Stn., Ashland, WI 54806]

85-003402 Serns, S. L. PROPORTIONAL STOCK DENSITY INDEX - IS IT A USEFUL TOOL FOR ASSESSING FISH POPULATIONS IN NORTHERN LATITUDES? *Wis. Dep. Nat. Resour. Res. Rep.* 132. 11p. 1985. SFA 30(4)

[Wis. Dep. Nat. Resour., Woodruff] The length-frequency index, Proportional Stock Density (PSD), has been proposed as a method to evaluate the size structure of fish populations, and communities. The results of this method of appraising the size structure of a fish population and its relative well-being or balance may be impacted by several factors including fish distribution and behavior in relation to the method of collection and the impact of variable year class strength on the value determined in any one year. In Escanaba Lake, Wisconsin, PSD's for walleyes (calculated from both fyke net and angling catches) from 1956-82 varied widely due to methods of sampling and variable year class strength. I recommend that the use of PSD's or other length-frequency indices to evaluate size structure in a fish population or community be used with caution and only when combined with age-frequency and growth data.

85-003403 Thresher, R. E. DISTRIBUTION, ABUNDANCE, AND REPRODUCTIVE SUCCESS IN THE CORAL REEF FISH *ACANTHOCHROMIS POLYACANTHUS*. *Ecology* 66(4):1139-1150. 1985. SFA 30(4)

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85-003404 Wissimar, R. C. and C. A. Simenstad. ESTIMATING ESTUARINE CARRYING CAPACITY FOR JUVENILE CHUM SALMON (*ONCORHYNCHUS KETA*). *Estuaries* 8(2B):30A. 1985. Abstract only. SFA 30(4)

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SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC.

85-003405 Arnott, G. H. and A. D. McKinnon. DISTRIBUTION AND ABUNDANCE OF EGGS OF THE ANCHOVY, *ENGRAULIS AUSTRALIS ANTIPODUM* GUNTHER, IN RELATION TO TEMPERATURE AND SALINITY IN THE GIPPSLAND LAKES. *Aust. J. Mar. Freshwater Res.* 36(3):433-439. 1985. SFA 30(4)

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[Motupore Island Res. Stn., Univ. Papua New Guinea, Papua New Guinea]

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

85-003408 Eliassen, J. and I. Falk-Petersen. REPRODUCTIVE BIOLOGY OF THE ROUGHHEAD GRENADIER (*MACROURUS BERGLAX* LACEPÈDE) (PISCES, GADIFORMES) FROM THE CONTINENTAL SLOPE OF NORTHERN NORWAY. *Sarsia* 70(1):59-67. 1985. SFA 30(4)
[Inst. Fish., Univ. Tromsø, P.O. Box 3083 Guleng, N-9001 Tromsø, Norway]

85-003409 Giles, N. and F. A. Huntingford. VARIABILITY IN BREEDING BIOLOGY OF THREE-SPINED STICKLEBACKS (*GASTEROSTEUS ACULEATUS*): PROBLEMS WITH MEASURING POPULATION DIFFERENCES IN AGGRESSION. *Behaviour* 93(1-4):57-68. 1985. SFA 30(4)
[Sch. Sci., Univ. Buckingham, Buckingham MK18 1EG, England]

85-003410 Hahtonen, L. and O. Joensuu. SPAWNING SHOAL STRUCTURE AND SPAWNING TIME OF THE HERRING (*CLUPEA HARENGUS*) IN THE NORTHEASTERN PART OF THE BOTHNIAN BAY. *Bothnian Bay Rep.* 3:3-12. 1984. SFA 30(4)
[Lehtoranta 14 B, SF-90500 Oulu, Finland]

85-003411 Hashim, M. T. and A. J. Salamah. SEXUAL MATURATION AND RELATED STUDIES ON *GERRES RUPPELLII* KLUNZ, OF THE RED SEA. *J. Fac. Mar. Sci. (Jeddah)*. 4:233-249. 1985. SFA 30(4)
[Fac. Mar. Sci., King Abdulaziz Univ., Jeddah, Saudi Arabia]

85-003412 Hughes, A. L. SEASONAL CHANGES IN FECUNDITY AND SIZE AT FIRST REPRODUCTION IN AN INDIANA POPULATION OF THE MOSQUITOFISH *GAMBUSIA AFFINIS*. *Am. Midl. Nat.* 114(1):30-36. 1985. SFA 30(4)
[Dep. Biol., Univ. Scranton, Scranton, PA 18510]

85-003413 Luer, C. A. and P. W. Gilbert. MATING BEHAVIOR, EGG DEPOSITION, INCUBATION PERIOD, AND HATCHING IN THE CLEARNOSE SKATE, *RAJA EGLANTERIA*. *Environ. Biol. Fishes* 13(3):161-171. 1985. SFA 30(4)
[Mote Mar. Lab., Sarasota, FL 33577]

85-003414 Matsuyama, M. and S. Matsuura. [ON THE OVARIAN MATURATION AND SPAWNING OF THE LANDLOCKED LARGE TYPE AYU *PLECOGLOSSUS ALTIVELIS* IN LAKE BIWA.] *Bull. Jpn. Soc. Sci. Fish.* 51(5):691-698. 1985. In Japanese with English summ. SFA 30(4)
[Dep. Fish., Fac. Agric., Kyushu Univ. 46-04, Hakozaki, Higashi, Fukuoka 812, Japan]

85-003415 McAda, C. W. and R. S. Wydoski. GROWTH AND REPRODUCTION OF THE FLANNELMOUTH SUCKER, *CATOSTOMUS LATIPINNIS*, IN THE UPPER COLORADO RIVER BASIN, 1975-76. *Great Basin Nat.* 45(2):281-286. 1985. SFA 30(4)
[U.S. FWS, 551 25½ Rd., Grand Junction, CO 81505]

85-003416 Mori, S. REPRODUCTIVE BEHAVIOUR OF THE LANDLOCKED THREE-SPINED STICKLEBACK, *GASTEROSTEUS ACULEATUS MICROCEPHALUS*, IN JAPAN. *Behaviour* 93(1-4):21-35. 1985. SFA 30(4)
[Sakamoto Fish-farm, Mie Pref., Japan]

85-003417 Mysak, L. A.; K. Hamilton and C. Groot. YEAR-TO-YEAR CHANGES IN THE RETURN MIGRATION ROUTES OF FRASER RIVER SOCKEYE SALMON. *Discovery* 14(2):40-43. 1985. SFA 30(4)
[Dep. Oceanogr., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

SPORT FISHERY ABSTRACTS

SPAWNING HABITS AND MOVEMENTS, FECUNDITY, ETC. (CONTINUED)

85-003418 Ostrander, G. K. and J. A. Ward. THE FUNCTION OF THE PELVIC FINS DURING COURTSHIP AND SPAWNING IN THE ORANGE CHROMIDE, *ETROPLUS MACULATUS*. *Environ. Biol. Fishes* 13(3):203-210. 1985. SFA 30(4)

[Coll. Ocean Fish. Sci., WH-10, Univ. Wash., Seattle 98195]

85-003419 Quinn, S. P. and M. R. Ross. NON-ANNUAL SPAWNING IN THE WHITE SUCKER, *CATOSTOMUS COMMERSONI*. *Copeia* 1985(3):613-618. 1985. SFA 30(4)

[Dep. Nat. Resour., Game Fish Div., 2024 Newton Rd., Albany, GA 31708]

85-003420 Schneider, J. C. YELLOW PERCH MATURITY AND FECUNDITY AS A FUNCTION OF AGE AND GROWTH. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1915. 22p. 1984. SFA 30(4)

The fecundity and rate of maturity of yellow perch (*Perca flavescens*) were examined in relation to age and size. Samples were obtained from native and experimental populations in small lakes and ponds in lower Michigan. Fecundity was more strongly related to parental weight or length than to age. Attainment of sexual maturity was a function of sex, length, and age, with the older and larger individuals more likely to be mature. For males, which mature sooner than females, the smallest mature specimen was 61 mm and the largest immature fish was 106 mm. Males matured after one growing season unless growth was unusually poor. For females, the smallest mature specimen was 86 mm and the largest immature fish was 180 mm. Females rarely matured after one growing season but most had matured after four. The study populations matured sooner and were less fecund than yellow perch populations cited in the literature (mostly in the Great Lakes) but were similar to some populations of European perch.

85-003421 Shepherd, G. R. and C. B. Grimes. REPRODUCTION OF WEAKFISH, *CYNOScion REGALIS*, IN THE NEW YORK BIGHT AND EVIDENCE FOR GEOGRAPHICALLY SPECIFIC LIFE HISTORY CHARACTERISTICS. *NOAA Fish. Bull.* 82(3):501-511. 1984. SFA 30(4)

[NMFS, Northeast Fish. Cent. Wood Hole Lab., Woods Hole, MA 02543]

85-003422 Volobuyev, V. V. SPAWNING CHARACTERISTICS AND ECOLOGY OF YOUNG CHUM SALMON, *ONCORHYNCHUS KETA*, IN THE TAU Y RIVER BASIN (NORTHERN COAST OF THE OKHOTSK SEA). *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(6):156-167. 1984. SFA 30(4)

[TINRO, Magadan, USSR]

85-003423 Wagner, W. C. LAKE TROUT SPAWNING HABITAT IN THE GREAT LAKES. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1904. 13p. 1982. SFA 30(4)

Substrate where lake trout spawned and fry were produced or only fry were found is described and illustrated. Rounded or angular rock about 5 to 50 cm diameter with interstice depths of 30 cm or more gave the best protection for eggs and fry. Thus, future lake trout stocking should be made over this type of substrate, and artificial structures should duplicate these conditions.

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC.

85-003424 Barus, V.; D. S. Pavlov; V. K. Nezdolij and J. Gajdusek. DOWNSTREAM FISH MIGRATION FROM THE MOSTISTE AND VESTONICE RESERVOIRS (CSSR) IN SPRING. *Folia Zool.* 34(1):75-87. 1985. SFA 30(4)

[Inst. Vert. Zool., Czech. Acad. Sci., Brno, Czechoslovakia]

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC. (CONTINUED)

85-003425 Betteridge, G. MOVEMENTS OF RAINBOW TROUT (*SALMO GAIRDNERI*) AND SPLAKE (*SALVELINUS FONTINALIS* X *S. NAMAYCUSH*) IN A SMALL ONTARIO LAKE AS REVEALED BY ULTRASONIC TELEMETRY. *Ontario Fish. Tech. Rep. Ser. No. 18*. iii + 10p. 1985. SFA 30(4)

[Ont. Minist. Nat. Resour., Res. Sect., Fish. Br., Maple, ON L0J 1E0, Canada]

85-003426 Crawford, R. E. and C. G. Carey. RETENTION OF WINTER FLOUNDER LARVAE WITHIN A RHODE ISLAND SALT POND. *Estuaries* 8(2B):217-227. 1985. SFA 30(4)

[Freshwater Inst., 501 University Crescent, Winnipeg, MB R3T 2N6, Canada]
Two winter flounder, *Pseudopleuronectes americanus*, spawning sites in a 630 hectare Rhode Island lagoon were located by collecting eggs with a modified epibenthic sled towed by boat. A two-dimensional vertically-averaged hydrodynamic model predicted that larvae hatched at these spawning sites would be minimally displaced by tidal movement. Ichthyoplankton samples taken hourly during the day at six locations on March 27 and April 27, 1981 reflected the larval distribution predicted by the model. Larval retention within this lagoon appeared to be strongly influenced by the hydrodynamics of this system. It is suggested that the hydrodynamic features of lagoons are exploited in the reproductive strategies of estuarine species and that the relationship between hydrodynamics and the quality of nursery habitat must be considered before making hydraulic modifications to these systems.

85-003427 Grout, G. G. QUANTITATIVE DISTRIBUTION OF BLACK SEA FLOUNDER LARVAE, *PLATICHTHYS FLESUS LUSCUS*, IN MOLOCHNIY LAGOON. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(6):149-155. 1984. SFA 30(4)

[azNIIRKh, Berdyansk, USSR]

85-003428 Hermes, R. DISTRIBUTION OF NEUSTONIC LARVAE OF HAKES *UROPHYCIS* SPP. AND FOURBEARD ROCKLING *ENCHELYOPUS CIMBRIUS* IN THE GEORGES BANK AREA. *Trans. Am. Fish. Soc.* 114(4):604-608. 1985. SFA 30(4)

[Taxon. Arbeitsgr. Biol. Anstalt Helgoland, Zool. Inst. Mus., Martin-Luther-King-Platz 3, 2000 Hamburg 13, West Germany]

85-003429 Irie, T. [OCCURRENCE AND DISTRIBUTION OF OFFSHORE MIGRATING JUVENILE CHUM SALMON ALONG THE PACIFIC COAST OF NORTHERN JAPAN.] *Bull. Jpn. Soc. Sci. Fish.* 51(5):749-754. 1985. In Japanese with English summ. SFA 30(4)

[Hokkaido Reg. Fish. Res. Lab., Kushiro, Hokkaido 085, Japan]

85-003430 Izumi, T.; H. Kojima; N. Kasahara; M. Ban and K. Yamauchi. [DOWNSTREAM MIGRATORY BEHAVIOR AND SEAWATER ADAPTABILITY IN THE YEARLING HATCHERY-REARED MASU SALMON (*ONCORHYNCHUS MASOU*) IN AN ARTIFICIAL STREAM.] *Sci. Rep. Hokkaido Fish Hatchery* No. 39. p. 39-46. 1984. In Japanese with English summ. SFA 30(4)

[Hokkaido Fish Hatchery, Hokkaido, Japan]

85-003431 Ouellet, P. and J. J. Dodson. TIDAL EXCHANGE OF ANADROMOUS RAINBOW SMELT (*OSMERUS MORDAX*) LARVAE BETWEEN A SHALLOW SPAWNING TRIBUTARY AND THE ST. LAWRENCE ESTUARY. *Can. J. Fish. Aquatic Sci.* 42(8):1352-1358. 1985. In English with French summ. SFA 30(4)

[Peches Oceans, Div. Rech., C.P. 15000, 901 Cap-Diamant, PQ G1K 7Y7, Canada]

SPORT FISHERY ABSTRACTS

MOVEMENTS, SEASONAL AND DEPTH DISTRIBUTION, ETC. (CONTINUED)

85-003432 Rijnsdorp, A. D.; M. Van Stralen and H. W. Van der Veer. SELECTIVE TIDAL TRANSPORT OF NORTH SEA PLAICE LARVAE *PLEURONECTES PLATESSA* IN COASTAL NURSERY AREAS. *Trans. Am. Fish. Soc.* 114(4):461-470. 1985. SFA 30(4)
[Neth. Inst. Fish. Invest., P.O. Box 68, 1970 AB IJmuiden, Netherlands]

85-003433 Rudstam, L. G. and J. J. Magnuson. PREDICTING THE VERTICAL DISTRIBUTION OF FISH POPULATIONS: ANALYSIS OF CISCO, *COREGONUS ARTEDII*, AND YELLOW PERCH, *PERCA FLAVESCENS*. *Can. J. Fish. Aquatic Sci.* 42(6):1178-1188. 1985. In English with French summ. SFA 30(4)
[Dep. Zool., Univ. Stockholm, S106 91 Stockholm, Sweden]

85-003434 Shaw, R. F.; W. J. Wiseman, Jr.; R. E. Turner; L. J. Rouse, Jr. R. E. Condrey and F. J. Kelly, Jr. TRANSPORT OF LARVAL GULF MENHADEN *BREVOORTIA PATRONUS* IN CONTINENTAL SHELF WATERS OF WESTERN LOUISIANA: A HYPOTHESIS. *Trans. Am. Fish. Soc.* 114(4):452-460. 1985. SFA 30(4)
[Cent. Wetland Resour., La. State Univ., Baton Rouge 70803]

85-003435 Smith, W. G. and W. W. Morse. RETENTION OF LARVAL HADDOCK *MELANOGRAMMUS AEGLEFINUS* IN THE GEORGES BANK REGION, A GYRE-INFLUENCED SPAWNING AREA. *Mar. Ecol. Prog. Ser.* 24(1-2):1-13. 1985. SFA 30(4)
[NMFS, Sandy Hook Lab., Highlands, NJ 07732]

85-003436 Tanaka, M. FACTORS AFFECTING THE INSHORE MIGRATION OF PELAGIC LARVAL AND DEMERSAL JUVENILE RED SEA BREAM *PAGRUS MAJOR* TO A NURSERY GROUND. *Trans. Am. Fish. Soc.* 114(4):471-477. 1985. SFA 30(4)
[Dep. Fish., Fac. Agric., Kyoto Univ., Kitashirakawa, Kyoto 606, Japan]

85-003437 Timola, O.; R. Hyvärinen and A. Laine. DISTRIBUTION OF THE FOURHORN SCULPIN, *MYOXOCEPHALUS QUADRICORNIS*, IN THE NE BOTHNIAN BAY, AND POSSIBLE HORIZONTAL MIGRATIONS OF SCULPINS AS INDICATED BY INFECTION WITH THE ACANTHOCEPHALAN *CORYNOSOMA SEMERME*. *Bothnian Bay Rep.* 3:45-54. 1984. SFA 30(4)
[Peräneri Res. Stn., Univ. Oulu, SF-90570 Oulu, Finland]

FOODS/FEEDING

85-003438 Andersen, K. P. SOME REFLECTIONS ON THE POSSIBILITY OF ESTIMATING PREDATION AND DIGESTION PARAMETERS FROM STOMACH DATA. *Dana* 5:87-94. 1985. SFA 30(4)
[Danish Inst. Fish. Mar. Res., Charlottenlund Castle, DK-2920 Charlottenlund, Denmark]

85-003439 Busiahn, T. R. PREDATOR RESPONSES TO FISH COMMUNITY CHANGES IN LAKE SUPERIOR. *Great Lakes Fish. Comm. Spec. Publ.* 85-3. p. 39-56. 1985. SFA 30(4)
[Great Lakes Indian Fish Wildl. Comm., Odonah, WI 54861]

85-003440 Da Silva, J. and J. D. Neilson. LIMITATIONS OF USING OTOLITHS RECOVERED IN SCATS TO ESTIMATE PREY CONSUMPTION IN SEALS. *Can. J. Fish. Aquatic Sci.* 42(8):1439-1442. 1985. In English with French summ. SFA 30(4)
[J. D. Neilson: Mar. Fish. Div., Biol. Stn., St. Andrews, NB E0G 2X0, Canada]

FOODS/FEEDING (CONTINUED)

85-003441 Daan, N.; A. D. Rijnsdorp and G. R. Van Overbeeke. PREDATION BY NORTH SEA HERRING *CLUPEA HARENGUS* ON EGGS OF PLAICE *PLEURONECTES PLATESSA* AND COD *GADUS MORHUA*. *Trans. Am. Fish. Soc.* 114(4):499-506. 1985. SFA 30(4)
[Neth. Inst. Fish Invest., P.O. Box 68, 1970 AB IJmuiden, Netherlands]

85-003442 Davis, T. L. O. THE FOOD OF BARRAMUNDI, *LATES CALCARIFER* (BLOCH), IN COASTAL AND INLAND WATERS OF VAN DIEMEN GULF AND THE GULF OF CARPENTARIA, AUSTRALIA. *J. Fish Biol.* 26(6):669-682. 1985. SFA 30(4)
[Div. Fish. Res., CSIRO Mar. Lab., GPO Box 1538, Hobart, Tas. 7001, Australia]

85-003443 Diamant, A. and M. Shpigel. INTERSPECIFIC FEEDING ASSOCIATIONS OF EILAT (TELEOSTEI: SERRANIDAE) WITH OCTOPUSES AND MORAY EELS IN THE GULF OF EILAT (AQABA). *Environ. Biol. Fishes* 13(2):153-159. 1985. SFA 30(4)
[Hebrew Univ. Jerusalem, H. Steinitz Mar. Biol. Lab., P.O. Box 469, Eilat 88103, Israel] Temporary interspecific feeding associations between groupers (Serranidae) and moray eels or octopuses in the Red Sea were observed 41 times during over 400 scuba dives. Such behavior is a feeding tactic adopted by groupers in which small organisms, escaping the primary (=nuclear) predators (eel or octopus), are caught by the groupers. Eels and octopuses, due to their body structure or shape, gain access to crevices that most fishes cannot enter. This feeding tactic increases the diversity of food resources used by their associates by making normally inaccessible food items available to them. Serranids from many parts of the world exploit normally unavailable food resources in this fashion. It appears that this is a learned behavior which increases food diversity and feeding efficiency.

85-003444 Eriksson, M. P. G. PREY DETECTABILITY FOR FISH-EATING BIRDS IN RELATION TO FISH DENSITY AND WATER TRANSPARENCY. *Ornis Scand.* 16:1-7. 1985. SFA 30(4)
[Dep. Zool., Univ. Gothenburg, P.O. Box 25059, S-400 31 Gothenburg, Sweden]

85-003445 Fitzhugh, G. R. and J. W. Fleeger. GOBY (PISCES: GOBIIDAE) INTERACTIONS WITH MEIOFAUNA AND SMALL MACROFAUNA. *Bull. Mar. Sci.* 36(3):436-444. 1985. SFA 30(4)
[Coastal Fish. Inst., Cent. Wetland Resour., La. State Univ., Baton Rouge 70803]

85-003446 Friedland, K. D. CORRELATIONS BETWEEN THE LOCAL DISTRIBUTION PATTERNS OF THE FILTER-FEEDING FISH *BREVOORTIA TYRANNUS* (PISCES: CLUPEIDAE) AND PLANKTON RELATED GRADIENTS. *Estuaries* 8(2B):18A. 1985. Abstract only. SFA 30(4)
[NMFS, Sandy Hook Lab., Highlands, NJ]

85-003447 Green, J. M.; G. Martel and E. A. Kingsland. FORAGING TIME ALLOCATION IN A TERRITORIAL FISH: INFLUENCE OF REPRODUCTIVE ACTIVITIES. *Mar. Ecol. Prog. Ser.* 24(1-2):23-26. 1985. SFA 30(4)
[Biol. Dep., Memorial Univ. Newfoundland, St. John's NF A1B 3X9, Canada]

85-003448 Hansen, L. P. and P. Pethon. THE FOOD OF ATLANTIC SALMON, *SALMO SALAR* L., CAUGHT BY LONG-LINE IN NORTHERN NORWEGIAN WATERS. *J. Fish Biol.* 26(5):553-562. 1985. SFA 30(4)
[Dir. Wildl. Freshwater Fish, Fish Res. Div., Tungasletta 2, N-7000 Trondheim, Norway] A total of 1145 stomachs from Atlantic salmon caught over the shelf off Helgeland/Trøndelag, and in the oceanic waters of

FOODS/FEEDING (CONTINUED)

85-003448 .CONTINUED Andenes, northern Norway during late winter-spring, 1969-1972 were examined. Food was found in 52.9% of the stomachs examined. The most important food items found in fish caught in the Helgeland/Trondelag area were euphausiids and hyperiid amphipods while the myctophid *Benthosema glaciale*, the squid *Gonatus fabricii* and euphausiids were found most frequently in the salmon caught off Andenes. Most salmon had preyed upon only one species, and few stomachs contained three or more prey species. The type of food did not appear to be related to the length of the fish. It is suggested that some mesopelagic feeding occurred.

85-003449 Hinshaw, J. M. EFFECTS OF ILLUMINATION AND PREY CONTRAST ON SURVIVAL AND GROWTH OF LARVAL YELLOW PERCH *PERCA FLAVESCENS*. *Trans. Am. Fish. Soc.* 114(4):540-545. 1985. SFA 30(4)

[N.C. Coop. Fish. Res. Unit, N.C. State Univ., Raleigh 27695]

85-003450 Jude, D. J. and F. J. Tesar. RECENT CHANGES IN THE INSHORE FORAGE FISH OF LAKE MICHIGAN. *Can. J. Fish. Aquatic Sci.* 42(6):1154-1157. 1985. In English with French summ. SFA 30(4)

[Great Lakes Res. Div., Univ. Mich., Ann Arbor 48109]

85-003451 Keast, A. DEVELOPMENT OF DIETARY SPECIALIZATIONS IN A SUMMER COMMUNITY OF JUVENILE FISHES. *Environ. Biol. Fishes* 13(3):211-224. 1985. SFA 30(4)

[Dep. Biol., Queen's Univ., Kingston, ON K7L 3N6, Canada]

85-003452 Keast, A. PLANKTIVORY IN A LITTORAL-DWELLING LAKE FISH ASSOCIATION: PREY SELECTION AND SEASONALITY. *Can. J. Fish. Aquatic Sci.* 42(6):1114-1126. 1985. In English with French summ. SFA 30(4)

[Dep. Biol., Queen's Univ., Kingston, ON K7L 3N6, Canada]

85-003453 Kjørboe, T.; P. Munk and J. G. Støttrup. FIRST FEEDING BY LARVAL HERRING *CLUPEA HARENGUS* L. *Dana* 5:95-107. 1985. SFA 30(4)

[Danish Inst. Fish. Mar. Res., Charlottenlund Castle, DK-2920, Charlottenlund, Denmark]

85-003454 Krueger, C. K. and J. R. Paine. REPORT TO THE COUNCIL OF LAKE COMMITTEES. *Great Lakes Fish. Comm. Spec. Publ.* 85-3. p. 125-134. 1985. SFA 30(4)

[Cornell Univ., Ithaca, NY 14853]

85-003455 Lammens, E. H. R. R.; H. W. De Nie; J. Vijverberg and W. L. T. Van Densen. RESOURCE PARTITIONING AND NICHE SHIFTS OF BREAM (*ABRAMIS BRAMA*) AND EEL (*ANGUILLA ANGUILLA*) MEDIATED BY PREDATION OF SMELT (*OSMERUS EPERLANUS*) ON *DAPHNIA HYALINA*. *Can. J. Fish. Aquatic Sci.* 42(8):1342-1351. 1985. In English with French summ. SFA 30(4)

[Limnol. Inst., de Akkers 47, 8536 VD Oosterzee, Netherlands]

85-003456 Lammens, E. H. R. R. A TEST OF A MODEL FOR PLANKTIVOROUS FILTER FEEDING BY BREAM *ABRAMIS BRAMA*. *Environ. Biol. Fishes* 13(4):289-296. 1985. SFA 30(4)

[Limnol. Inst., Tjeukemeer Lab., de Akkers 47, 8536 VD Oosterzee, Netherlands]

FOODS/FEEDING (CONTINUED)

85-003457 Marsh, A. C. and A. J. Ribbink. FEEDING-SITE UTILIZATION IN THREE SYMPATRIC SPECIES OF *PETROTILAPIA* (PISCES, CICHLIDAE) FROM LAKE MALAWI. *Biol. J. Linn. Soc.* 25(4):331-338. 1985. SFA 30(4)

[Dep. Zool., Univ. Witwatersrand, Johannesburg 2001, South Africa]

85-003458 Mauchline, J. and J. D. M. Gordon. TROPHIC DIVERSITY IN DEEP-SEA FISH. *J. Fish Biol.* 26(5):527-535. 1985. SFA 30(4)

[Dunstaffnage Mar. Res. Lab., P.O. Box No. 3, Oban, Argyll PA34 4AD, Scotland]

85-003459 Mills, C. A.; W. R. C. Beaumont and R. T. Clarke. SOURCES OF VARIATION IN THE FEEDING OF LARVAL DACE *LEUCISCUS LEUCISCUS* IN AN ENGLISH RIVER. *Trans. Am. Fish. Soc.* 114(4):519-524. 1985. SFA 30(4)

[Freshwater Biol. Lab., River Lab., East Stoke, Wareham, Dorset BH20 6BB, England]

85-003460 Munk, P. and T. Kjørboe. FEEDING BEHAVIOR AND SWIMMING ACTIVITY OF LARVAL HERRING (*CLUPEA HARENGUS*) IN RELATION TO DENSITY OF COPEPOD NAUPLII. *Mar. Ecol. Prog. Ser.* 24(1-2):15-21. 1985. SFA 30(4)

[Danish Inst. Fish. Mar. Res., Charlottenlund Castle, DK-2920 Charlottenlund, Denmark]

85-003461 Muth, K. M. CHANGES IN PREY FISH ABUNDANCE IN WESTERN LAKE ERIE DURING PERIODS OF HIGH AND LOW PREDATOR ABUNDANCE. *Great Lakes Fish. Comm. Spec. Publ.* 85-3. p. 27-38. 1985. SFA 30(4)

[U.S. FWS, Sandusky Biol. Stn., Sandusky, OH 44870]

85-003462 Nagata, M. [ECOLOGICAL STUDIES ON THE PREDATION OF CHUM SALMON FRY BY FRESH WATER SCULPIN, *COTTUS NOZAWAE* SYNDER.] *Sci. Rep. Hokkaido Fish Hatchery* No. 39. p. 55-65. 1984. In Japanese with English summ. SFA 30(4)

[Hokkaido Fish Hatchery, Hokkaido, Japan]

85-003463 Napier, K. and D. Tarter. DIET AND SEASONAL FEEDING HABITS OF THE JOHNNY DARTER, *ETHEOSTOMA NIGRUM* RAFINESQUE FROM MUD RUN, MASON COUNTY, WEST VIRGINIA. *Proc. W. Va. Acad. Sci.* 57(1):13. 1985. Abstract only. SFA 30(4)

[Dep. Biol. Sci., Marshall Univ., Huntington, WV] The food and feeding habits of the Johnny darter, *Etheostoma nigrum* Rafinesque, were investigated from Mud Run, Mason County, West Virginia. The fish were carnivorous. Dipteran larvae, based on dry weight, numbers, and frequency of occurrence, were the most important food item. Copepods and ostracods, based on numbers and frequency of occurrence, were also important. Ephemeropterans, based on dry weight, were important food items throughout the year, while plecopterans were important during the late fall and winter. Isopods and oligochaets, based on dry weight, were also important food items. Absence of terrestrial insects and the presence of inorganic materials in the diet suggested these fish were benthic feeders. Diel feeding periodicities occurred throughout the study. Feeding occurred primarily during the daylight hours, which suggested feeding was stimulated by visual cues. Seasonal feeding intensities indicated feeding was heaviest during the late fall and winter and lightest during the spring. Ivlev's electivity index suggested fish were opportunistic feeders. Several factors could have resulted in biased electivity index values.

85-003464 Nepszy, S. J. WALLEYE IN WESTERN LAKE ERIE: RESPONSES TO CHANGE IN PREDATORS AND PREY. *Great Lakes Fish. Comm. Spec. Publ.* 85-3. p. 57-76. 1985. SFA 30(4)

FOODS/FEEDING (CONTINUED)

85-003464 CONTINUED

[Ontario Minist. Nat. Resour., Lake Erie Fish. Stn., Wheatley, ON NOP 2PO, Canada]

85-003465 Nico, L. G. and D. C. Taphorn. DIET OF *ACESTORRHYNCHUS MICROLEPIS* (PISCES: CHARACIDAE) IN THE LOW LLANOS OF VENEZUELA. *Copeia* 1985(3):794-796. 1985. SFA 30(4)

[Mus. Cienc. Nat., Univ. Nac. Exp. Llanos Occidentales Ezequiel Zamora, Guanare, Portuguesa, Venezuela]

85-003466 O'Brien, W. J. and C. Luecke. APPARENT SIZE CHOICE OF ZOOPLANKTON BY PLANKTIVOROUS SUNFISH: EXCEPTIONS TO THE RULE. *Environ. Biol. Fishes* 13(3):225-233. 1985. SFA 30(4)

[Dep. Syst. Ecol., Univ. Kans., Lawrence 66045] Choice of the apparently largest prey has been implicated as an important component of the size choice behavior of several planktivorous fish species. In this study we describe the effect of several aspects of prey placement, apparent and absolute size, and motion on the choice behavior of bluegill or white crappie. In binary choice experiments, bluegill usually choose *Daphnia* prey on the basis of apparent size. However, when both prey were close to the fish and the absolutely larger prey was apparently smaller, the fish commonly chose the absolutely larger. The horizontal placement of two prey also altered choice such that the more forward directed prey was chosen even when apparently smaller. White crappie, when offered a choice between a diatomid copepod or daphnid prey, chose the daphnid most of the time. Bluegill sunfish offered moving versus non-moving heat-killed daphnids commonly chose the one in motion. Apparent size choice is still a good overall describer of bluegill and white crappie prey choice, but it is not the only mechanism involved in prey choice behavior of these fish.

85-003467 Pennington, M. ESTIMATING THE AVERAGE FOOD CONSUMPTION BY FISH IN THE FIELD FROM STOMACH CONTENTS DATA. *Dana* 5:81-86. 1985. SFA 30(4)

[NMFS, Woods Hole Lab., Woods Hole, MA 02543] It is shown that a simple Bajkov type relationship exists between the amount of food consumed and the quantity of food observed in the stomach for fish whose rate of evacuation is only a function of current stomach contents. Based on this result, an unbiased estimator of the average consumption of food by a population is derived.

85-003468 Riemann, B. POTENTIAL IMPORTANCE OF FISH PREDATION AND ZOOPLANKTON GRAZING ON NATURAL POPULATIONS OF FRESHWATER BACTERIA. *Appl. Environ. Microbiol.* 50(2):187-193. 1985. SFA 30(4)

[Freshwater Biol. Lab., Univ. Copenhagen, DK-3400 Hillerod, Denmark] The rates of ingestion of natural bacterial assemblages by natural populations of zooplankton (>50 μ m in size) were measured during a 19-day period in eutrophic Frederiksborg Slotsso, Denmark, as well as in experimental enclosures (containing 5.3 m³ of lake water). The fish and nutrients of the enclosures were manipulated. In enclosures without fish, large increases in ingestion by zooplankton >140 μ m in size were found (up to 3 μ g of C liter⁻¹h⁻¹), compared with values less than 0.3 μ g of C liter⁻¹h⁻¹ in the enclosures with fish and in the open lake. *Daphnia cucullata* and *D. galeata* dominated the community of zooplankton of >140 μ m. Ingestion rates for zooplankton between 50 and 140 μ m decreased after a period of about 8 days, in all enclosures and in the lake, to values below 0.1 μ g of C liter⁻¹h⁻¹. On the last 2 sampling days somewhat higher values were observed in the enclosures with fish present. The >50- μ m zooplankton ingested 48 to 51% of the bacterial net secondary production in enclosures without fish, compared to 4% in the enclosures with added fish. Considering the sum of bacterial secondary production plus

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85-003468 CONTINUED biomass change, 35 to 41% of the available bacteria were ingested by zooplankton of $>50\text{ }\mu\text{m}$ in the enclosures without fish, compared with 4 to 6% in the enclosures with added fish and 21% in the open lake. Fish predation reduced the occurrence of zooplankton sized $>50\text{ }\mu\text{m}$ and thus left a large proportion of the available bacteria to zooplankton sized $<50\text{ }\mu\text{m}$. In fact, there were 4.6×10^3 to 5.0×10^3 flagellates (4 to $8\text{ }\mu\text{m}$ in size) ml^{-1} in the enclosures with fish added as well as in the lake, compared with 0.5×10^2 to $2.3 \times 10^2\text{ ml}^{-1}$ in the enclosures without fish. This link in the food chain was reduced when fish predation on zooplankton was eliminated and a direct route of dissolved organic matter, via the bacteria to the zooplankton, was established.

85-003469 Schramm, H. L., Jr. and A. V. Zale. EFFECTS OF COVER AND PREY SIZE ON PREFERENCES OF JUVENILE LARGEMOUTH BASS FOR BLUE TILAPIAS AND BLUEGILLS IN TANKS. *Trans. Am. Fish. Soc.* 114(5):725-731. 1985. SFA 30(4)

[Dep. Fish. Aquacult., Sch. For. Resour. Conserv., Univ. Fla., Gainesville 32611]

85-003470 Seki, J.; H. Mayama and I. Shimizu. FOOD AND FEEDING HABIT OF JUVENILE SALMON (GENUS *ONCORHYNCHUS*) IN COASTAL WATERS OF ISHIKARI BAY, HOKKAIDO - II. VERTICAL DISTRIBUTION OF FOOD ORGANISMS OF THE COASTAL WATERS IN SPRING, 1980-1981. *Sci. Rep. Hokkaido Salmon Hatchery* No. 39. p. 27-90. 1985. In Japanese with English summ. SFA 30(4)

[Hokkaido Salmon Hatchery, Fish. Agency, 2-2 Nakanoshima, Toyohira-ku, Sapporo 062, Japan]

85-003471 Skinner, W. D. SIZE SELECTION OF FOOD BY CUTHROAT TROUT, *SALMO CLARKI*, IN AN IDAHO STREAM. *Great Basin Nat.* 45(2):327-331. 1985. SFA 30(4)

[Dep. Biol., Idaho State Univ., Pocatello 83209] The mean size of food consumed by cutthroat trout from Palisades Creek in southeastern Idaho increased with trout length. Number of organisms of terrestrial origin, number of aquatic larvae, number of ants, and number of berries from redstem dogwood were related to trout length. The size range and number of taxa consumed increased with trout size, indicating that as trout get larger, they broaden their feeding menu. The minimum size of food consumed was relatively constant for all trout, but larger trout appeared to feed more from the stream bottom. Trout may have a minimum length of food, below which items cannot be detected as food. Other possible factors affecting the feeding of cutthroat are mentioned.

85-003472 Smith, E. P. ESTIMATING THE RELIABILITY OF DIET OVERLAP MEASURES. *Environ. Biol. Fishes* 13(2):125-138. 1985. SFA 30(4)

[Dep. Stat., VPI&SU, Blacksburg, VA 24061] Diet overlap measures, commonly used in studies of resource partitioning and competition in fish, are too often treated as fixed values; in fact, they are random variables. Two methods for estimating the variance of some overlap measures using stomach content data are examined here: the jackknife and the bootstrap. Simulation results indicate that the methods work well. In addition, they are valid for either continuous (biomass, percent volume) or discrete (abundance) data. Applications indicate that outliers, such as a stomach much different than the others, may have large influence in determining the overlap value.

85-003473 Smith, S. M.; J. G. Hoff; S. P. O'Neil and M. P. Weinstein. COMMUNITY AND TROPIC ORGANIZATION OF NEKTON UTILIZING SHALLOW MARSH HABITATS, YORK RIVER, VIRGINIA. *NOAA Fish. Bull.* 82(3):455-466. 1984.

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85-003473 CONTINUED SFA 30(4)

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85-003474 Solomon, G.; M. Shimizu and Y. Nose. [THE FEEDING HABITS OF ROSE BITTERLING IN THE SHIN TONE RIVER.] *Bull. Jpn. Soc. Sci. Fish.* 51(5):711-716. 1985. In Japanese with English summ. SFA 30(4)

85-003475 Spataru, P. and M. Gophen. FOOD COMPOSITION AND FEEDING HABITS OF *ASTATOTILAPIA FLAVIIOSEPHI* (LORTET) IN LAKE KINNERET (ISRAEL). *J. Fish Biol.* 26(5):503-507. 1985. SFA 30(4)

[Kinneret Limnol. Lab., P.O.B. 345, Tiberias, Israel 14102] Food composition and feeding habits of 102 specimens of *Astatotilapia (Haplochromis) flaviiiosephi* (Lortet, 1883), collected in Lake Kinneret during 1973-1975 and 1981-1982, was studied. *A. flaviiiosephi* is relatively abundant in the littoral zone of the lake. Females feed mostly on chironomid larvae, oligochaetes and amphipods whilst males consume mostly gastropods. Small fry are rarely preyed upon, or collected by both sexes. The adaptive relation between the teeth and the type of food and the ecological status of *A. flaviiiosephi* in the Kinneret ecosystem is discussed.

85-003476 Thomas, G.; A. Kacelnik and J. Van der Meulen. THE THREE-SPINED STICKLEBACK AND THE TWO-ARMED BANDIT. *Behaviour* 93(1-4):227-240. 1985. SFA 30(4)

[Zool. Lab., Univ. Groningen, Netherlands]

85-003477 Van Densen, W. L. T. FEEDING BEHAVIOUR OF MAJOR 0+ FISH SPECIES IN A SHALLOW, EUTROPHIC LAKE (TJEUKEMEER, THE NETHERLANDS). *J. Appl. Ichthyol.* 1(2):49-70. 1985. In English with French and German summ. SFA 30(4)

[Dep. Fish Cult. Inland Fish., Agric. Univ. Wageningen, Netherlands] The forage base and the food selectivity of 0+ representatives of six abundant freshwater fish species were studied in a shallow, eutrophic Dutch lake. Most species relied on the zooplankton; the size-selective predation in early summer was directed to the smaller copepods and in late summer to larger cladocerans and copepods than concurrently present in the lake. *Daphnia* spp. and cyclopoid copepods were the main zooplankton taxa for smelt, perch and pikeperch. Energetically, the large cladoceran, *Leptodora kindtii*, was especially important for pikeperch. Bream and roach preyed upon smaller zooplankton than the other fish species. The influence of the zooplankton predation by abundant 0+ fish was clear from a small mean *Daphnia* size in September; this size is to be used as an indicator in fishery management. *Neomysis integer*, the most important macrofauna species, was consumed by perch, pikeperch and ruffe; pikeperch was most size-selective in this respect. The 0+ ruffe was a typically benthivorous fish. Only the 0+ pikeperch became piscivorous, especially in years when smelt was abundant.

85-003478 Wells, L. CHANGES IN LAKE MICHIGAN'S PREY FISH POPULATIONS WITH INCREASING SALMONID ABUNDANCE, 1962 TO 1984. *Great Lakes Fish. Comm. Spec. Publ.* 85-3. p. 13-25. 1985. SFA 30(4)

[Great Lakes Fish. Lab., Ann Arbor, MI 48105]

AGE AND GROWTH

85-003479 Berg, R. AGE DETERMINATION OF EELS, *ANGUILLA ANGUILLA* (L.): COMPARISON OF FIELD DATA WITH OTOLITH RING PATTERNS. *J. Fish Biol.* 26(5):537-544. 1985. SFA 30(4)

AGE AND GROWTH (CONTINUED)

85-003479 CONTINUED

[Inst. Seinforsch Fisch., Ergat 5, D-7752 Insel Reichenan, West Germany] Otoliths of eels recaptured up to 5 years after tagging were used for comparative work on the determination of annual ring patterns. It was possible to locate false annuli caused by the tagging procedure and subsequently to define annual rings in otoliths within the known period between first tagging and final catch. This determination gave an estimate of the size of the annual zones. Growth depression caused by tagging could be shown in cross sections of otoliths. Well defined annulus patterns in micrographs of otoliths from tagged eels were compared with otoliths from untagged eels. This comparison allowed a dimensional calibration of the ageing method and the recognition of misleading additional rings. Mean annual length increments of 47x88 mm and L_{∞} of 123x3 mm were determined.

85-003480 Gjosaeter, J.; P. Dayaratne; O. A. Bergstad; H. Gjosaeter; M. I. Sousa and I. M. Beck. AGEING TROPICAL FISH BY GROWTH RINGS IN THE OTOLITHS. *FAO Fish. Circ.* No. 776. iv + 54p. 1984. SFA 30(4)

[Dep. Fish. Biol., Univ. Bergen, J-5011 Bergen-Nordnes, Norway]

85-003481 Hashim, M. T. and A. J. Salamah. THE CATCH AND GROWTH RATES OF *GERRES RUPPELLII* KLUNZ, 1884 OF THE RED SEA. *J. Fac. Mar. Sci. (Jeddah)*. 4:213-231. 1985. SFA 30(4)

[Fac. Mar. Sci., King Abdulaziz Univ., Jeddah, Saudi Arabia]

85-003482 Helfman, G. S.; E. L. Bozeman and E. B. Brothers. COMPARISONS OF AMERICAN EEL GROWTH RATES FROM TAG RETURNS AND LENGTH-AGE ANALYSES. *NOAA Fish. Bull.* 82(3):519-522. 1984. SFA 30(4)

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85-003483 Joensuu, O. and L. Hahtonen. AGE AND GROWTH STUDIES ON THE BALTIC HERRING, *CLUPEA HARENGUS*, IN THE NORTHEASTERN PART OF THE BOTHNIAN BAY. *Bothnian Bay Rep.* 3:21-30. 1984. SFA 30(4)

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85-003484 Johnson, A. G. and C. H. Saloman. AGE, GROWTH, AND MORTALITY OF GRAY TRIGGERFISH, *BALISTES CAPRISCUS*, FROM THE NORTHEASTERN GULF OF MEXICO. *NOAA Fish. Bull.* 82(3):485-492. 1984. SFA 30(4)

[NMFS, 3500 Delwood Beach Rd., Panama City, FL 32407]

85-003485 Mann, R. H. K. and B. Steinmetz. ON THE ACCURACY OF AGE-DETERMINATION USING SCALES FROM RUDD, *SCARDINUS ERYTHROPHthalmus* (L.), OF KNOWN AGE. *J. Fish Biol.* 26(5):621-628. 1985. SFA 30(4)

[Freshwater Biol. Assoc., River Lab., East Stoke, Wareham, Dorset BH20 6BB, England]

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[Cent. Environ. Stud., Ariz. State Univ., Tempe 85287]

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[Dep. Fish Oceans, P.O. Box 5667, St. John's, NF A1C 5X1, Canada]

85-003489 Price, E. E.; J. R. Stauffer, Jr. and M. C. Swift. EFFECT OF TEMPERATURE ON GROWTH OF JUVENILE *OREOCHROMIS MOSSAMBICUS* AND *SAROTHERODON MELANOTHERON*. *Environ. Biol. Fishes* 13(2):149-152. 1985. SFA 30(4)

[Univ. Md., Cent. Environ. Estuarine Stud., Frostburg State Coll., Gunter Hall, Frostburg, MD 21532]

85-003490 Radtke, R. L.; M. L. Fine and J. Bell. SOMATIC AND OTOLITH GROWTH IN THE OYSTER TOADFISH (*OPSANUS TAU* L.). *J. Exp. Mar. Biol. Ecol.* 90(3):259-275. 1985. SFA 30(4)

[Bell W. Baruch Inst. Mar. Biol. Coastal Res., Univ. S.C., Columbia 29208] Otoliths from oyster toadfish were measured and examined for annuli and daily increments. Distinct annual increments made it feasible to determine growth parameters which demonstrated sexual dimorphism in growth. Microincrements, judged to be daily on the basis of two separate criteria, were enumerated and measured to provide verification of annuli. Utilization of multivariate mathematical models relating age to otolith growth and somatic growth simplified age determination. These methods for examining otoliths should be applicable to other fish species and make it possible to link growth and mortality rates to life history and environmental occurrences.

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85-003493 Tucker, R. AGE VALIDATION STUDIES ON THE SPINES OF THE SPURDOG (*SQUALUS ACANTHIAS*) USING TETRACYCLINE. *J. Mar. Biol. Assoc. U.K.* 65(3):641-651. 1985. SFA 30(4)

[Fish. Lab., Lowestoft, Suffolk NR33 OHT, England]

85-003494 Vollestad, L. A. AGE DETERMINATION AND GROWTH OF YELLOW EELS, *ANGUILLA ANGUILLA* (L.), FROM A BRACKISH WATER, NORWAY. *J. Fish Biol.* 26(5):521-525. 1985. SFA 30(4)

[Dep. Biol., Div. Gen. Physiol., Univ. Oslo, P.O. Box 1051 Blindern, N-0316 Oslo 3, Norway]

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85-003497 Ahnelt, H. [INFORMATION ON *GobiUS BUCCHICHI* STEINDACHNER, 1870 AND *GOBUS FALLAX* SARATO, 1889 (PISCES, GOBIIDAE).] *Ann. Nat. Mus. Wien* 86:1-5. 1984. In German with English summ. SFA 30(4)
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85-003498 Andrews, M. J. and A. Wheeler. RARE AND LITTLE-KNOWN FISHES IN THE THAMES ESTUARY. *J. Fish Biol.* 27(1):59-71. 1985. SFA 30(4)
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85-003517 Wongratana, T.; H. Senou and C. Vittayanon. FIRST RECORD OF THE STRIPED GREY MULLET *MUGIL CEPHALUS* (PISCES: MUGILIDAE) FROM THAILAND, WITH A KEY TO ALL LOCAL SPECIES. *Nat. Hist. Bull. Siam Soc.* 32(1):11-20. 1984. SFA 30(4)
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ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY

85-003518 All-Union Research Institute of Marine Fisheries and Oceanography. FISHERY OCEANOGRAPHY OF MARINE PRODUCTIVE AREAS: COLLECTED PAPERS. *Minist. Fish. USSR All-Union Res. Inst. Mar. Fish. Oceanogr.* 222p. 1984. In Russian with English summ. SFA 30(4)

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[Natal Parks Board, P.O. Box 662, Pietermaritzburg, 3200 South Africa]

85-003520 Bianchi, E. W., Jr. POPULATION REGULATION IN BLUEGILLS (*LEPOMIS MACROCHIRUS*). Ph.D. dissertation, Univ. Ariz. 50p. 1984. From Diss. Abstr. Int. B Sci. Eng. 46(1):45. 1985. SFA 30(4)

Residency or emigratory responses were triggered in bluegills 6.0-8.0 cm TL and 10.0-12.0 cm TL by availability of resources. Individuals became residents if resources were present and not at carrying capacity. Individuals in excess of carrying capacity emigrated. Carrying capacity of bluegills 6.0-8.0 cm TL increased with increased food availability. Carrying capacity also increased with increased cover. Bluegills 10.0-12.0 cm TL did not respond to changes in cover. The two sizes reacted differently when the initial number introduced into pools was varied. Single bluegills 6.0-8.0 cm TL established residency whereas bluegills 10.0-12.0 cm TL required the presence of at least one other bluegill before establishing residency. Competition between size classes were prevented by habitat segregation in which smaller fish used areas with cover and larger fish areas of open water. These results indicate that bluegills have evolved innate, stereotypic fixed action pattern for individually assessing resources by becoming residents if resources are present and numbers below carrying capacity or emigrating if resources are absent or numbers at carrying capacity. These findings suggest that the long history of overpopulation and stunting of bluegills in closed areas is due to the absence of an emigratory avenue.

85-003521 Fahy, E. CYCLIC FLUCTUATIONS IN THE ABUNDANCE OF TROUT *SALMO TRUTTA* L. *Arch. Hydrobiol. Suppl.* 70(3):404-428. 1985. SFA 30(4)

[Fish. Res. Cent., Dep. Fish. For., Abbotstown, Castleknock, Co. Dublin, Ireland] Cyclic phenomena in Irish sea trout stocks are explained by the operation of a climatic regulator. More favourable growing conditions increase the rate at which trout attain migratory dimension and thus promote faster turnover in the occupation of nursery area. A divided return of sea run fish contributes to the cyclic phenomena. Models of juvenile and sea run populations are devised. Details of the climatic mechanism are obscured by a poor understanding of the inter-relationship of spring and autumn descending juveniles, an imprecise definition of mean smolt age and the need for a more suitable formulation of growing season. Hot, dry summers have not been shown to affect adversely the production of trout although fish are displaced from their nursery streams at such times.

85-003522 Herke, W. H.; B. D. Rogers and E. E. Knudsen. HABITS AND HABITATS OF YOUNG SPOTTED SEATROUT IN LOUISIANA MARSHES. *La. Agric. Exp. Stn. Res. Rep.* No. 3. 1984. SFA 30(4)

Commercial catches of spotted seatrout, *Cynoscion nebulosus*, have declined in Louisiana since 1973. Published literature suggests the spawning area ranges from the upper estuary to the open Gulf, and for Louisiana in particular, the major nursery has not been clearly defined. More than 250,000 acres of marsh in Louisiana have been semi-impounded by low-level dams called weirs, with the crest set 6 inches below average marsh soil level. Spotted seatrout samples were taken from five areas across the Louisiana coast by traps and trawls. Data from these studies were evaluated to determine seasonal presence, spawning and nursery habitats, movement, and the effects of weirs. Data from two studies at the Sabine National Wildlife Refuge in southwest Louisiana indicate that the majority of the young-of-the-year enter the marsh in late August through September at a size

ABUNDANCE, FACTORS OF; SURVIVAL AND MORTALITY (CONTINUED)

85-003522 CONTINUED range of 15-45 mm SL; this suggests a protracted spawn at some distant location. Data collected in 1982 indicate minor recruitment also occurred in mid-April. Young-of-the-year spotted seatrout were not caught as often in the shallow marsh habitat as in the canals and bayous. There was a general emigration of 45- to 355-mm SL seatrout from the marsh in November and December. Low catches of spotted seatrout in all five areas, compared to other species, suggest that although they utilize the marsh, canals and bayous to some extent, these are not the major nursery areas. The major nursery area for spotted seatrout for Louisiana may be in the higher salinity bays, or more likely, the nearshore Gulf. Nevertheless, even if the marsh is not the primary nursery area, organisms emigrating from the marsh provide a vitally important food source for spotted seatrout. Two studies which directly compared abundance of juvenile spotted seatrout in natural and semi-impounded habitats found higher catches in the natural areas. These two studies, and trap data which demonstrate that young spotted seatrout traveled mostly at middle and bottom depths in the canals, indicate that conventional fixed-crest weirs are detrimental to the immigration of young-of-the-year spotted seatrout into the marsh habitats. The complete effects of weirs upon this species, and other fishes and crustaceans, have not been sufficiently evaluated to determine proper fishery management criteria for design, installation, and operation of weirs or other water control structures.

85-003523 Ivankov, V. I. THE CAUSES OF PERIODICAL AND ANNUAL FLUCTUATIONS IN ABUNDANCE AND OF CHANGES IN THE BIOLOGICAL FEATURES OF PINK SALMON, *ONCORHYNCHUS GORBUSCHA*, FROM THE SOUTH KURIL ISLANDS. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(6):96-107. 1984. SFA 30(4)
[Univ. Far East, Vladivostok, USSR]

85-003524 Kushnarenko, A. I. INCREASE IN STOCKS OF CASPIAN CLUPEIDS DURING THE BAN ON MARINE FISHING. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(6):108-118. 1984. SFA 30(4)
[Caspian Fish. Res. Inst., Kasp NIRkh, Astrakhan, USSR]

85-003525 Martin, J. H. A. and K. A. Mitchell. INFLUENCE OF SEA TEMPERATURE UPON THE NUMBERS OF GRILSE AND MULTI-SEA-WINTER ATLANTIC SALMON (*SALMO SALAR*) CAUGHT IN THE VICINITY OF THE RIVER DEE (ABERDEENSHIRE). *Can. J. Fish. Aquatic Sci.* 42(9):1513-1521. 1985. In English with French summ. SFA 30(4)
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[J.L.B. Smith Inst. Ichthyol., P.B. 1015, Grahamstown, South Africa 6140]

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[Dep. Biol., Fac. Sci., Chulalongkorn Univ., Bangkok 10500, Thailand]

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PARASITES AND DISEASES-GENERAL

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[Arbeitsgr. Verhaltensforsch., Abt. Biol., Ruhr-Univ., Postfach 102148, 4630 Bochum 1, West Germany]

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[Cent. Mar. Stud., Univ. Calif., Santa Cruz 95064]

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85-003558 Price, D. J. GENETICS OF SUSCEPTIBILITY AND RESISTANCE TO DISEASE IN FISHES. *J. Fish Biol.* 26(5):509-519. 1985. SFA 30(4)
[Dep. Biol. Sci., Plymouth Polytech., Plymouth PL4 8AA, England] The genetics of disease resistance in fish is examined. Major genes may cause skeletal or other phenotypic deformities and have also been implicated in the development of neoplasia. Others may affect viability through pleiotropic effects, or induce stress and therefore predispose to invasion by pathogens. Resistance usually appears, however, to be of a multifactorial nature. Variations in resistance between related species and between populations of the same species are described. In order to obtain an idea of the within-population variation, heritability estimates have been obtained in some instances. Generally they are low, but may still indicate a sufficient level to be of use in a selection programme. The results of a limited number of selection programmes are described.

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[Dep. Fish., Fac. Agric., Miyazaki Univ., Miyazaki 889-21, Japan]

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[Inst. Aquacult., Univ. Stirling, Stirling, Scotland]

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[Inst. Anat. Physiol. Hygiene, Univ. Bonn, Katzenburgweg 7-9, 33 Bonn, West Germany]

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[Hokkaido Fish Hatchery, Nakanoshima 2, Toyohira, Sapporo 062, Japan]

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[Res. Scholar, Bareilly Coll., Bareilly, India]

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[Pathol. Lab., Aquacult. Dep., South-East Asian Fish. Dev. Cent., P.O. Box 256, Iloilo City, Philippines]

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[U.S. FWS, Natl. Fish. Res. Cent., Bldg. 204, Naval Stn., Seattle, WA 98115]

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[Dep. Fish. Allied Aquacult., Ala. Agric. Exp. Stn., Auburn Univ., AL 36879] European catfish (*Silurus glanis*) fingerlings (2 to 4 g each) were tested for susceptibility to channel catfish virus (CCV). They had supported CCV replication at 2 days after intraperitoneal injection with 0.1 of saline containing 10^5 TCID₅₀. Homogenized visceral organs (liver, kidney and spleen) contained $\geq 10^4$ TCID₅₀/0.1 ml at 2 days post inoculation (PI) but at 4 days the titer decreased to 10^1 TCID₅₀. Bathing European catfish in CCV yielded only one positive sample with a titer of $10^{2.5}$ TCID₅₀ per 0.1 ml of tissue. No clinical signs of CCV developed and no virus related deaths occurred.

85-003580 Sano, T.; H. Fukuda and H. Horiguchi. EPIZOOTICS IN SERIOLA FRY ASSOCIATED WITH A VIRUS. *Fish Health News* 13(4):iii. 1984. SFA 30(4)

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[Univ. Bergen, Zool. Lab., N-5000 Bergen, Norway] Mortality and several physiological stress parameters have been registered for different life

TOXICOLOGY; BIOASSAYS (CONTINUED)

85-003644 CONTINUED stages of Atlantic salmon and brown trout, exposed to varying levels of aluminium in an open flow system. Salmon swim-up larvae were more sensitive than postlarvae when exposed to Al-concentrations from 110 to 300 $\mu\text{g/l}$ at pH 5, both naturally occurring in acid water supply, and added as $\text{Al}_2(\text{SO}_4)_3$. Survival time (L_{50}) decreased with increasing Al-concentration and

the dose-response relationship was better correlated with the $\text{Al}(\text{OH})_2^{2+}$ monomer than with Al^{+++} , $\text{Al}(\text{OH})_2^+$ or AlF_2^{2+} . Exposure of salmon parr to natural variation in Al (50-180 $\mu\text{g/l}$) at pH 5.3 induced a hyperventilatory response that was maintained for 26 days, when compared with parr exposed to pH 5.5. Hyper-ventilation was induced in pH 5.5 when the Al level was raised to 250 $\mu\text{g/l}$ at day 27. Increased hemoatocrit and minor reduction in chloride were observed during this sublethal stress. Brown trout exposed at pH 5 to the same Al regime showed no sublethal stress symptoms. After 34 days acclimation in this water, trout were exposed to 360 $\mu\text{g/Al}$ (pH 5) and had acquired improved tolerance compared with control. Acclimation had occurred both in respiratory parameters and in salt balance. Mortality was associated with coughing, hyperventilation, increased haematocrit and reduced plasma levels for sodium, chloride and osmolality.

85-003645 Goodfellow, W. L., Jr.; R. J. Klauda and W. C. Graves. TEST CHAMBER FOR EXPERIMENTS WITH EARLY LIFE STAGES OF FISHES. *Prog. Fish-Cult.* 47(3):193-194. 1985. SFA 30(4)

[EA Engineering, Science and Technology, Inc., Hunt Valley/Loveton Center, Spaks, MD 21152]

85-003646 Haider, S. and N. Upadhyaya. EFFECT OF COMMERCIAL FORMULATION OF FOUR ORGANOPHOSPHORUS INSECTICIDES ON THE OVARIES OF A FRESHWATER TELEOST, *MYSTUS VITTATUS* (BLOCH) - A HISTOLOGICAL AND HISTOCHEMICAL STUDY. *J. Environ. Sci. Health B Pestic. Food Contam. Agric. Wastes* 20(3):321-340. 1985. SFA 30(4)

[Dep. Zool., Banaras Hindu Univ., Varanasi-221 005, India]

85-003647 Hashimoto, S. THE EFFECT OF TEMPERATURE ON THE TOXICITY OF THE MEP (SUMITHION) AND THE HEAT ACCLIMATION ON THE RAINBOW TROUT. *Sci Rep. Hokkaido Salmon Hatchery* No. 39. p. 113-123. 1985. In Japanese. SFA 30(4)

[Hokkaido Salmon Hatchery, Fish. Agency, 2-2 Nakanoshima, Toyohira-ku, Sapporo, 062 Japan]

85-003648 Hermens, J.; E. Broekhuizen; H. Canton and R. Wegman. QUANTITATIVE STRUCTURE ACTIVITY RELATIONSHIPS AND MIXTURE TOXICITY STUDIES OF ALCOHOLS AND CHLOROHYDROCARBONS: EFFECTS ON GROWTH OF *DAPHNIA MAGNA*. *Aquat. Toxicol.* 6(3):209-217. 1985. SFA 30(4)

[Dep. Vet. Pharmacol., Pharm. Toxicol., P.O. Box 80176, 3508 TD Utrecht, Netherlands]

85-003649 Holdway, D. A. and D. G. Dixon. ACUTE TOXICITY OF PULSE-DOSED METHOXYCHLOR TO JUVENILE AMERICAN FLAGFISH (*JORDANELLA FLORIDAE* GOODE AND BEAN) AS MODIFIED BY AGE AND FOOD AVAILABILITY. *Aquat. Toxicol.* 6(4):243-250. 1985. SFA 30(4)

[Dep. Biol., Univ. Waterloo, Waterloo, ON N2L 3G1, Canada]

85-003650 Jones, K. A.; T. J. Hara and E. Scherer. BEHAVIORAL MODIFICATIONS IN ARCTIC CHAR (*SALVELINUS ALPINUS*) CHRONICALLY EXPOSED TO SUBLETHAL pH. *Physiol. Zool.* 58(4):400-412. 1985. SFA 30(4)

[Berkley and Co., Inc., Trilene Dr., Spirit Lake, IA 51360] *Salvelinus alpinus*. The effects of acid stress on the locomotor and chemoreceptive behavior of Arctic char were determined by quantifying their movements within

TOXICOLOGY; BIOASSAYS (CONTINUED)

85-003650 CONTINUED a laboratory trough. Three behavioral parameters were measured: activity, spatial preference within the trough, and the attraction to a plume of food extract presented at different concentrations. Char were preexposed for 14 days to pH 7.8 (controls), 7.0, 5.5, 5.0, 4.75, or 4.5, and then individually tested in the trough at the same pH. The behavior of pH 7.0 and 5.5 char was not statistically different from the controls. Char exposed to pH 5.0 behaved much like control fish but were more active and less responsive to the extract. Marked behavioral changes occurred when char were exposed to either pH 4.75 or 4.5. At these levels activity was sharply reduced, time spent at the ends of the trough increased, and attraction for the extract was highly depressed. Some individuals were strongly affected, while others were affected only moderately. We suggest that behavioral abnormalities brought on by acid stress are responsible, in part, for the disappearance of fish populations from lakes and streams where pH's have been chronically depressed by acid pollution.

85-003651 Karlsson-Norrgren, L.; P. Rumm; C. Haux and L. Förlin. CADMIUM-INDUCED CHANGES IN GILL MORPHOLOGY OF ZEBRAFISH, *BRACHYDANIO RERIO* (HAMILTON-BUCHANAN), AND RAINBOW TROUT, *SALMO GAIIRDNERI* RICHARDSON. *J. Fish Biol.* 27(1):81-95. 1985. SFA 30(4)

[Dep. Pathol., Fac. Vet. Med., Swedish Univ. Agric. Sci., S-750 07 Uppsala, Sweden]

85-003652 Krantzberg, G. and P. M. Stokes. BENTHIC MACROINVERTEBRATES MODIFY COPPER AND ZINC PARTITIONING IN FRESHWATER-SEDIMENT MICROCOSMS. *Can. J. Fish. Aquatic Sci.* 42(9):1465-1473. 1985. In English with French summ. SFA 30(4)

[Inst. Environ. Stud., Univ. Toronto, Toronto, ON M5S 1A4, Canada]

85-003653 Kwain, W. and G. A. Rose. GROWTH OF BROOK TROUT *SALVELINUS FONTINALIS* SUBJECT TO SUDDEN REDUCTIONS OF pH DURING THEIR EARLY LIFE HISTORY. *Trans. Am. Fish. Soc.* 114(4):564-570. 1985. SFA 30(4)

[Ontario Minist. Nat. Resour., P.O. Box 130, Sault Ste. Marie, ON P6A 5L5, Canada]

85-003654 Lindström-Seppä, P. SEASONAL VARIATION OF THE XENOBIOTIC METABOLIZING ENZYME ACTIVITIES IN THE LIVER OF MALE AND FEMALE VENDACE (*COREGONUS ALBULA* L.). *Aquat. Toxicol.* 6(4):323-331. 1985. SFA 30(4)

[Dep. Physiol., Univ. Kuopio, P.O. Box 6, SF-70211 Kuopio 21, Finland]

85-003655 Mathers, R. A.; J. A. Brown and P. H. Johansen. THE GROWTH AND FEEDING BEHAVIOUR RESPONSES OF LARGEMOUTH BASS (*MICROPTERUS SALMOIDES*) EXPOSED TO PCP. *Aquat. Toxicol.* 6(3):157-164. 1985. SFA 30(4)

[Dep. Biol., Queen's Univ., Kingston, ON K7L 3N6, Canada]

85-003656 Meade, J. W. ALLOWABLE AMMONIA FOR FISH CULTURE. *Prog. Fish-Cult.* 47(3):135-145. 1985. SFA 30(4)

[U.S. FWS, R. D. #4, Box 63, Wellsboro, PA 16901]

85-003657 Meyerhoff, R. D.; D. W. Grothe; S. Sauter and G. K. Dorulla. CHRONIC TOXICITY OF TEBUTHIURON TO AN ALGA (*SELENASTRUM CAPRICORNUTUM*), A CLADOCERAN (*DAPHNIA MAGNA*), AND THE FATHEAD MINNOW (*PIMEPHALES*)

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85-003658 Milling, D. M. and M. B. Maddock. ACTIVATION OF POLYCYCLIC AROMATIC HYDROCARBONS BY HEPATIC S-9 FROM A MARINE FISH. *Bull. Environ. Contam. Toxicol.* 35(3):301-307. 1985. SFA 30(4)

[M.B. Maddock: Inst. Mar. Sci., Univ. N.C. at Chapel Hill, Morehead City 28557]

85-003659 Mohsin, A. K. M. PRELIMINARY OBSERVATION ON LETHAL SALINITY AND pH OF CATFISH (*PANGASIU SUTCHI* FOWLER) LARVAE. *Malay. Appl. Biol.* 14(1):57-58. 1985. SFA 30(4)

[Fac. Fish. Mar. Sci., Univ. Pertanian Malaysia, Serdang, Selangor, Malaysia]

85-003660 Norberg, T. J. and D. I. Mount. A NEW FATHEAD MINNOW (*PIMEPHALES PROMELAS*) SUBCHRONIC TOXICITY TEST. *Environ. Toxicol. Chem.* 4(5):711-718. 1985. SFA 30(4)

[U.S. EPA, Environ. Res. Lab., Duluth, MN 55804] The most commonly used test for evaluating the toxicity of effluents to fish and invertebrates has been the acute lethality test. However, effluents frequently are not acutely toxic, and so assessing the sublethal effects on fish and invertebrates is important. Described herein is a rapid method to estimate the chronic toxicity of effluents to the fathead minnow (*Pimephales promelas*). Tests are initiated using newly hatched minnow larvae and are run for 7 d under static-renewal conditions. It is a cost-effective, simple, short-term toxicity test, and survival and growth are the measures of effects. Approximately 70 tests using this technique have been run with various types of effluents. Included in this article are results from representative effluent tests and also from tests conducted using Dursban, zinc and copper. The results indicate that this subchronic toxicity test gives a good estimate of chronic toxicity.

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[Univ. Joensuu, Dep. Biol., P.O. Box 111, SF-80101 Joensuu, Finland]

85-003662 Palawski, D.; J. B. Hunn and F. J. Dwyer. SENSITIVITY OF YOUNG STRIPED BASS TO ORGANIC AND INORGANIC CONTAMINANTS IN FRESH AND SALINE WATERS. *Trans. Am. Fish. Soc.* 114(5):748-753. 1985. SFA 30(4)

[Columbia Natl. Fish. Res. Lab., U.S. FWS, Rt. 1, Columbia, MO 65201]

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[Dep. Biol., Water Pollut. Res. Lab., Concordia Univ., Montreal, PQ H3G 1M8, Canada]

85-003664 Petersen, D. W.; K. M. Kleinow; R. C. Kraska and J. J. Lech. UPTAKE, DISPOSITION, AND ELIMINATION OF ACRYLAMIDE IN RAINBOW TROUT. *Toxicol. Appl. Pharmacol.* 80(1):58-65. 1985. SFA 30(4)

TOXICOLOGY; BIOASSAYS (CONTINUED)

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[J.J. Lech: Dep. Pharmacol. Toxicol., Med. Coll. Wis., 8701 Watertown Plank Rd., Milwaukee, WI 53226]

85-003665 Phillips, M. J.; R. J. Roberts; J. A. Stewart and G. A. Codd. THE TOXICITY OF THE CYANOBACTERIUM *MICROCYSTIS AERUGINOSA* TO RAINBOW TROUT, *SALMO GAIIRDNERI* RICHARDSON. *J. Fish Dis.* 8(4):339-344. 1985. SFA 30(4)

[Inst. Aquacult., Univ. Stirling, Stirling FK9 4LA, Scotland] *Microcystis aeruginosa* is a common cyanobacterium of nutrient-rich fresh waters. It has been implicated in a large number of poisoning incidents involving wild and domesticated terrestrial animals. The study showed that a pure strain of *M. aeruginosa* toxic to mice was non-toxic to rainbow trout immersed in a culture for 10 days. In contrast, when presented by intraperitoneal injections *Microcystis* caused an acute toxic response with 100% mortality of fish within 36 h. The histopathology of the response is described and contrasted with that to another cyanobacterium, *Anabaena cylindrica*, which was shown to be non-toxic by immersion or injection.

85-003666 Ringdal, O. and K. Julshamn. EFFECT OF SELENITE ON THE UPTAKE OF METHYLMERCURY IN COD (*GADUS MORHUA*). *Bull. Environ. Contam. Toxicol.* 35(3):335-344. 1985. SFA 30(4)

[Inst. Nutr., Div. Fish., P.O. Box 4285, N-5013 Nygaardstangen, Bergen, Norway]

85-003667 Rombough, P. J. and J. O. T. Jensen. REDUCED WATER UPTAKE AND RESISTANCE TO DEFORMATION IN ACID-EXPOSED EGGS OF STEELHEAD *SALMO GAIIRDNERI*. *Trans. Am. Fish. Soc.* 114(4):571-576. 1985. SFA 30(4)

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85-003668 Rosseland, B. O. and O. K. Skogheim. A COMPARATIVE STUDY ON SALMONID FISH SPECIES IN ACID ALUMINIUM-RICH WATER. II. PHYSIOLOGICAL STRESS AND MORTALITY OF ONE- AND TWO-YEAR-OLD FISH. *Inst. Freshwater Res. Drottningholm Rep.* No. 61. p. 186-194. 1984. SFA 30(4)

[Dir. Wildl. Freshwater Fish, P.O. Box 63, N-1432 Ås-NLH, Norway]

85-003669 Salki, A.; M. Turner; K. Patalas; J. Rudd and D. Findlay. THE INFLUENCE OF FISH-ZOOPLANKTON-PHYTOPLANKTON INTERACTIONS ON THE RESULTS OF SELENIUM TOXICITY EXPERIMENTS WITHIN LARGE ENCLOSURES. *Can. J. Fish. Aquatic Sci.* 42(6):1132-1143. 1985. In English with French summ. SFA 30(4)

[Dep. Fish. Oceans, Freshwater Inst., 501 University Crescent, Winnipeg, MB R3T 2N6, Canada]

85-003670 Skogheim, O. K. and B. O. Rosseland. A COMPARATIVE STUDY ON SALMONID FISH SPECIES IN ACID ALUMINIUM-RICH WATER. I. MORTALITY OF EGGS AND ALEVINS. *Inst. Freshwater Res. Drottningholm Rep.* No. 61. p. 177-185. 1984. SFA 30(4)

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85-003671 Skogheim, O. K.; B. O. Rosseland and I. H. Sevaldud. DEATHS OF SPAWNERS OF ATLANTIC SALMON (*SALMO SALAR* L.) IN RIVER OGNA, SW NORWAY, CAUSED BY ACIDIFIED ALUMINIUM-RICH WATER. *Inst. Freshwater Res. Drottningholm Rep.* No. 61. p. 195-202. 1984. SFA 30(4)

[Dir. Wildl. Freshwater Fish, P.O. Box 63, N-1432 Ås-NLH, Norway]

SPORT FISHERY ABSTRACTS

TOXICOLOGY; BIOASSAYS (CONTINUED)

85-003672 Smith, L. R.; T. M. Holsen; N. C. Ibay; R. M. Block and A. B. De Leon. STUDIES ON THE ACUTE TOXICITY OF FLUORIDE ION TO STICKLEBACK, FATHEAD MINNOW, AND RAINBOW TROUT. *Chemosphere* 14(9):1383-1389. 1985. SFA 30(4)
[Lab. Div., Kennedy/Jenks Engineers, 657 Howard St., San Francisco, CA 94105]

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85-003674 Stoker, P. W.; J. R. Larsen; G. M. Booth and M. L. Lee. PATHOLOGY OF GILL AND LIVER TISSUES FROM TWO GENERA OF FISHES EXPOSED TO TWO COAL-DERIVED MATERIALS. *J. Fish Biol.* 27(1):31-46. 1985. SFA 30(4)

[G.M. Booth: Dep. Chem., Brigham Young Univ., Provo, UT 84602]

85-003675 Thurston, R. V.; T. A. Gilfoil; E. L. Meyn; R. K. Zajdel; T. I. Aoki and G. D. Veith. COMPARATIVE TOXICITY OF TEN ORGANIC CHEMICALS TO TEN COMMON AQUATIC SPECIES. *Water Res.* 19(9):1145-1155. 1985. SFA 30(4)

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85-003678 Zaroogian, G.; J. F. Heltshe and M. Johnson. ESTIMATION OF TOXICITY TO MARINE SPECIES WITH STRUCTURE-ACTIVITY MODELS DEVELOPED TO ESTIMATE TOXICITY TO FRESHWATER FISH. *Aquat. Toxicol.* 6(4):251-270. 1985. SFA 30(4)

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FISH TOXICANTS

85-003679 Gingerich, W. H. and J. J. Rach. UPTAKE, BIOTRANSFORMATION, AND ELIMINATION OF ROTENONE BY BLUEGILLS (*LEPOMIS MACROCHIRUS*). *Aquat. Toxicol.* 6(3):179-196. 1985. SFA 30(4)

[U.S. FWS, P.O. Box 818, La Crosse, WI] Yearling bluegills (*Lepomis macrochirus*) were exposed to sublethal concentrations of [^{14} C]rotenone (5.2 μ g/l) for 30 days in a continuous flow exposure system and then transferred to clean, flowing water for an additional 21-day depuration period. Rates of uptake and elimination and profile of the rotenoid metabolites in head, viscera, and carcass components were evaluated by ^{14} C counting and by high performance liquid chromatography. Total [^{14} C]rotenone derived activity was relatively uniform in all body components within 3 days after initial exposure and remained constant during

FISH TOXICANTS (CONTINUED)

85-003679 CONTINUED the ensuing 27 days of exposure. Initial uptake rate coefficients were highest in viscera ($K_u = 80\text{h}^{-1}$) and were nearly identical for head ($K_u = 14\text{h}^{-1}$) and carcass ($K_u = 10\text{h}^{-1}$). Analyses of tissue extracts by high performance liquid chromatography confirmed the presence of at least six biotransformation products of rotenone. More than 60% of the activity extracted for viscera was present as a single peak which represented a compound that was extremely soluble in water. Rotenone composed only 0.3% of the extractable activity in viscera taken from fish exposed to rotenone for 30 days; however, rotenone accounted for 15.4% of extractable activity in the head and 20.1% in the carcass components. Rotenolone and 6',7' -dihydro-6',7' -dihydroxyrotenolone were tentatively identified as oxidation products in all tissue extracts. Elimination of ^{14}C activity from all body components was biphasic; both phases followed first-order kinetics. The rate of elimination was nearly equal for all body components during the initial phase but was most rapid from viscera during the second phase of elimination. Bioconcentration factors for the head, viscera, and carcass were 165, 3,550, and 125, respectively, when calculated on the basis of total ^{14}C activity but only 25.4, 11, and 26 when calculated as the concentration of parent material.

RESEARCH AND MANAGEMENT-GENERAL

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85-003681 Chernyavskiy, V. I. OPTIMUM EXPLOITATION OF THE VOBLA, *RUTILUS RUTILUS CASPICUS*, IN THE VOLGA-CASPIAN REGION. J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.) 24(6):125-130. 1984. SFA 30(4)
[KaspNIRKh, Astrakhan, USSR]

85-003682 Clark, R. D., Jr. THE EFFECTS OF FISHING REGULATIONS ON ANNUAL FLUCTUATIONS IN ABUNDANCE AND HARVEST. Mich. Dep. Nat. Resour. Fish. Res. Rep. No. 1917. 37p. 1984. SFA 30(4)

I simulated fluctuating year-class strength in a brown trout (*Salmo trutta*) fishery to estimate how the annual variability in population size and harvest was affected by exploitation under different minimum size limits and fishing mortality rates. My model included realistic details common to many fish populations in temperate regions; discrete annual reproduction and age-specific natural mortality, maturity, and fecundity. I hypothesized the primary mechanism regulating population size was density-dependent mortality in early life, but also that early mortality had a density-independent component which varied due to random environmental factors. I proposed a new method of representing this hypothesis quantitatively and of interpreting it ecologically. I conducted two series of stochastic simulations in which random variation was introduced at different stages of year-class formation. In the first, a range of instantaneous fishing mortality rates from 0.0 to 2.0 was simulated for 60 years each while the minimum size limit was held constant at 229 mm. In the second, a range of minimum size limits from 120 mm to 305 mm was simulated for 60 years each while the instantaneous fishing mortality rate was held constant at 0.7. Coefficients of variation ($100 \text{ s/bar } x$) for mean population sizes and harvests were used to compare relative variability between simulation. I found that the number of fish in the simulated populations had minimum variability when exploited near maximum sustainable yield (MSY) in weight, fishing rates of 0.6 to 1.6 at the 229-mm size limit and size limits of 150 mm to 250 mm at the 0.7 fishing rate. Simulated populations were highly variable when lightly exploited because the compensatory-density-dependent response was strong enough to overshoot the population's equilibrium level after a random disturbance. As exploitation increased, it reduced the strength of the density-dependent response. Near

SPORT FISHERY ABSTRACTS

RESEARCH AND MANAGEMENT-GENERAL (CONTINUED)

85-003682 CONTINUED MSY, the strength of density dependence was about equal to the strength of random disturbances, and this minimized variation in population size. Higher exploitation reduced the strength of density dependence to where it could not fully compensate for random disturbances, so variability increased. Variability of harvests did not match variability of populations because they had different age structures, a normal consequence of minimum size limit regulations or gear selectivity. Changing the fishing rate had little effect on variability of harvest, but changing the size limit from 120 mm to 305 mm increased the coefficient of variation of harvest from 13% to 44% when the standard deviations of random year-class fluctuations were 50% of their means. I concluded that for fisheries with fluctuating year-class strength, variability in annual catch is minimized by maintaining the lowest practical size limit and managing the fishery by controlling fishing effort.

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[NYS Coll. Agric. Life Sci., Cornell Univ., Ithaca, NY]

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[Dep. Fish. Wildl., 108 Adelaide Terrace, Perth, WA, Australia]

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85-003690 Thomas, J. W. BRIDGING THE MANAGEMENT GAP. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:59. 1984. SFA 30(4)
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85-003694 FRESHWATER * BIOLOGICAL ASSOCIATION. FRESHWATER BIOLOGICAL ASSOCIATION ANNUAL REPORT 1985. *Freshwater Biol. Assoc. Annu. Rep.* 53:144p. 1985. SFA 30(4)

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[1451 Green Rd., Ann Arbor, MI]

HABITAT ALTERATIONS

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[Swedish Environ. Res. Inst., P.O. Box 5207, S-402 24, Gothenburg, Sweden]

85-003697 Bain, M. B. FISH COMMUNITY STRUCTURE IN RIVERS WITH NATURAL AND MODIFIED DAILY FLOW REGIMES. *Ph.D. dissertation, Univ. Mass.* 163p. 1985. From Diss. Abstr. Int. B Sci. Eng. 46(3):717. 1985. SFA 30(4)

The effects of artificial flow fluctuations on stream fish communities was examined during a two-year period. A "natural experiment" comparing fish community structure in a river with a natural daily flow regime and a river with dramatic daily flow fluctuations was used to address questions concerning (1) appropriate macrodescriptors for examining the relationship between fish and habitat, (2) the effect of variable habitat conditions on stream fish communities, and (3) predictions of the intermediate-disturbance hypothesis. Three methods were used to evaluate the relationship between individual fish classes (species and size classes) and stream microhabitat: multivariate analysis of variance, discriminant analysis classification, and logistic regression. Two types of fish used the available habitat broadly while 13 fish used a distinct type of microhabitat. Of the 13 fish which were found to specialize on a particular combination of habitat parameters (water depth, current velocity, substrate coarseness and heterogeneity), nine used a similar set of microhabitat conditions. This group (guild) of fish were primarily found in shallow and slow water and constituted the majority of species and individuals in the natural river. Using discriminant analysis based on guild fish presence or absence in the natural river, habitat was classified into shallow slow habitat and general habitat. The density of fish (guild, nonguild) in each type of stream habitat (shallow slow, general) was compared between rivers and along a gradient of flow fluctuations in the modified river. Guild fish in shallow slow habitat appeared to be reduced in abundance by flow fluctuations. Under fluctuating habitat conditions, nonguild fish were found in greater abundance in both types of habitat. It was concluded that (1) artificial flow fluctuations alter fish community structure, (2) the response of fish to variable habitat depends on their microhabitat use patterns, (3) fish specializing on shallow slow microhabitat were reduced in abundance while other fish were either increased or unaffected, and (4) the changes in fish community structure associated with frequent habitat

SPORT FISHERY ABSTRACTS

HABITAT ALTERATIONS (CONTINUED)

85-003697 CONTINUED disturbances were consistent with the predictions of the intermediate-disturbance hypothesis.

85-003698 Barrett, H. RANGELAND EROSION A QUESTION OF MEASUREMENT. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:75-77. 1984. SFA 30(4)

85-003699 Bedell, T. E. LIVESTOCK GRAZING AND THE RIPARIAN ZONE. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:60-66. 1984. SFA 30(4)

[Ext. Rangeland Resour. Spec., Oreg. State Univ., Corvallis]

85-003700 Crouse, M. R. and R. R. Kindschy. A METHOD FOR PREDICTING RIPARIAN VEGETATION POTENTIAL OF SEMIARID RANGELANDS. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:18-24. 1984. SFA 30(4)

[Bur. Land Manage., P.O. Box 700, Vale, OR 97918] Predicting the potential of riparian areas to recover after protection from livestock is difficult because examples of pristine riparian communities have generally been destroyed by excessive grazing. This paper describes a method for predicting riparian site potential of streams and reservoirs in semiarid climates such as southeastern Oregon. The method is based on physical characteristics of stream and reservoir riparian zones, such as extent of water level fluctuation, persistence of flow, scouring, and soil type. These factors have been organized into keys for field use. Predicting the potential of riparian sites is essential to set priorities for the expenditure of funds to enhance and monitor those sites.

85-003701 European Inland Fisheries Advisory Commission. REPORT OF THE SYMPOSIUM ON HABITAT MODIFICATION AND FRESHWATER FISHERIES. *EIFAC Tech. Pap.* 47. vii + 32p. 1984. SFA 30(4)

[FAO of the UN, Rome, Italy]

85-003702 Gale, R. P. FISHERMAN, WOULD YOU RATHER BE A LOGGER? *Fisheries (Bull. Am. Fish. Soc.)* 10(4):6-8. 1985. SFA 30(4)

[Dep. Sociol., Univ. Oreg., Corvallis]

85-003703 Grabowski, S. J.; S. D. Hiebert and D. M. Lieberman. POTENTIAL FOR INTRODUCTION OF THREE SPECIES OF NONNATIVE FISHES INTO CENTRAL ARIZONA VIA THE CENTRAL ARIZONA PROJECT - A LITERATURE REVIEW AND ANALYSIS. *U.S. Dep. Int. Bur. Reclam. REC-ERC-84-7.* vii + 124p. 1984. SFA 30(4)

[Appl. Sci. Br., Div. Res. Lab. Serv., Eng. Res. Cent., Denver, CO]

85-003704 Johnson, R. O. and W. G. Nelson. BIOLOGICAL EFFECTS OF DREDGING IN AN OFFSHORE BORROW AREA. *Fla. Sci.* 48(3):166-188. 1985. SFA 30(4)

[828 Croton Rd., Melbourne, FL 32901]

85-003705 Lambert, D. K. THE ECONOMICS OF RANGE INVESTMENTS: PUBLIC AND PRIVATE PERSPECTIVES. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:86-98. 1984. SFA 30(4)

[Oreg. State Univ. Ext. Serv., Corvallis]

HABITAT ALTERATIONS (CONTINUED)

85-003706 Levings, C. D. JUVENILE SALMONID USE OF HABITATS ALTERED BY A COAL PORT IN THE FRASER RIVER ESTUARY, BRITISH COLUMBIA. *Mar. Pollut. Bull.* 16(6):248-254. 1985. SFA 30(4)

[West Vancouver Lab., 4160 Marine Drive, West Vancouver, BC V7V 1N6, Canada] Juvenile chinook, chum, and pink used habitats modified by a coal port at the Fraser estuary in southwestern British Columbia, Canada. Recent construction for expansion of the port has obliterated feeding areas, invertebrate communities, and possibly herring habitat from the local production system. Further studies are required to document recolonization of disrupted habitats and to investigate if present food webs are similar to those before construction. Juvenile salmon may be diverted by causeways and terminals and this also requires study.

85-003707 Peck, J. W. LAKE TROUT REPRODUCTION ON A MAN-MADE SPAWNING REEF. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1919. 34p. 1984. SFA 30(4)

Lake trout reproduction on two man-made spawning reefs in Presque Isle Harbor, Lake Superior in 1977-1980 was qualitatively and quantitatively described. Lake trout spawned during a 15- to 26-day period between 12 October - 14 November from sundown to at least midnight. Most of the spawners were of hatchery origin but wild trout increased from 4% to 25% during the period. Lake trout rarely visited the reefs more than once and may have deposited sex products on more than one reef. Number of spawners in 1979 was estimated to be 1,600 males and 600 females on the intake reef and 2,100 males and 1,100 females on the discharge reef. Egg deposition and swim-up fry production on the two reefs during 1977-1980 ranged 122-518/m² and 8-46/m², respectively. Physical characteristics, water chemistry, and biota indicated that these man-made reefs were favorable habitat for lake trout reproduction.

85-003708 Platts, W. S. COMPATIBILITY OF LIVESTOCK GRAZING STRATEGIES WITH RIPARIAN-STREAM SYSTEMS. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:67-74. 1984. SFA 30(4)

[U.S. For. Serv., Boise, ID]

85-003709 Sanderson, H. R. and T. M. Quigley. EVAL - A COORDINATED AND COMPREHENSIVE APPROACH TO RANGE MANAGEMENT. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:84-85. 1984. SFA 30(4)

[U.S. For. Serv., La Grande, OR]

85-003710 Smart, M. M.; R. G. Rada; D. N. Nielsen and T. O. Claflin. THE EFFECT OF COMMERCIAL AND RECREATIONAL TRAFFIC ON THE RESUSPENSION OF SEDIMENT IN NAVIGATION POOL 9 OF THE UPPER MISSISSIPPI RIVER. *Hydrobiologia* 126(3):263-274. 1985. SFA 30(4)

[Carolina Power and Light Co., Harris Energy Environ. Cent., Rt. 1, Box 327, New Hill, NC 27562]

85-003711 Stingham, T. K. IMPORTANCE OF PUBLICLY OWNED RANGELAND TO THE OREGON CATTLE INDUSTRY. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:45-58. 1984. SFA 30(4)

[Dep. Agric. Resour. Econ., Oreg. State Univ., Corvallis]

85-003712 Vavra, M. LIVESTOCK PRODUCTION POSSIBILITIES ON STREAMSIDE MEADOWS. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:35-44. 1984. SFA 30(4)

SPORT FISHERY ABSTRACTS

HABITAT ALTERATIONS (CONTINUED)

85-003713 Wadman, K. SOIL EROSION ON RANGE WATERSHEDS; A QUESTION OF MEASUREMENT. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:78-79. 1984. SFA 30(4)
[U.S. SCS, Bend, OR 97701]

HARVEST, CREEL CENSUS, ETC.

85-003714 Fenske, J. L. ATTITUDES AND ATTRIBUTES OF ANGLERS WHO FISH FOR TROUT IN MICHIGAN. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1916. 52p. 1983. SFA 30(4)

A questionnaire was used to determine the attitudes and attributes of anglers who fished for trout in Michigan. Information was collected for the 1981 fishing season on many aspects of trout fishing, with the main emphasis on anglers' opinions of various special trout stream regulations. Of the three types of trout fishing - Great Lakes, inland lakes, and streams - available in Michigan, fishing for Great Lakes trout and salmon had the highest participation rate. These anglers were also the most satisfied, spent the most money, and traveled the farthest. Trout fishing in inland lakes had the lowest participation rate and the least satisfied anglers. Trout stream anglers fished an average of four different streams, and found numbers of trout caught and size of trout caught to be of equal importance. When ranking the variables important to fishing in order of decreasing importance, trout stream anglers placed numbers and size of fish caught fifth and sixth, respectively. At the top of the list were nearness to public facilities and ease of access to the stream. The special trout stream regulations receiving the most support were artificial lures only and flies only. These also had the highest participation rate. The slotted size limit regulation, which was only in effect on a section of one stream, received less interest and participation. Of the two regulations which were not in effect at the time of the survey, only moderate support was shown for the catch-and-release fishery and even less for the inverted size limit regulation. There was a wide distribution in response to a question concerning the amount of area which should be open to salmon snagging, ranging from no legal areas to legal everywhere. In general, the data indicated that the majority of salmonid anglers support having at least some areas open to snagging in Michigan.

85-003715 Hoines, L. J.; W. D. Ward and C. Smith. WASHINGTON STATE SPORT CATCH REPORT 1984. *Wash. Dep. Fish.* 58p. 1985. SFA 30(4)
[115 Gen. Admin. Bldg., Olympia, WA 98504]

85-003716 McMurtry, M. J. and B. J. Shuter. THE LAKE OPEONGO CREEL SURVEY. *Ontario Fish. Tech. Rep. Ser.* No. 19. iii + 16p. 1985. SFA 30(4)
[Ontario Minist. Nat. Resour., Res. Sect., Fish. Br., Maple, ON L0J 1E0, Canada]

85-003717 Rakoczy, G. P. HARVEST LEVELS FOR COMMERCIALY EXPLOITED STOCKS OF LAKE WHITEFISH IN MICHIGAN WATERS OF LAKE SUPERIOR. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1912. 37p. 1983. SFA 30(4)

REGULATIONS

85-003718 Alexander, G. R. POTENTIAL EFFECTS OF DELAYING THE OPENING DATE OF FISHING SEASON ON YIELD AND PRODUCTION OF RAINBOW TROUT IN A SMALL MICHIGAN LAKE. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1928. 12p. 1985. SFA 30(4)

REGULATIONS (CONTINUED)

85-003719 Clark, R. D., Jr. THE IMPACT OF VOLUNTARY CATCH AND RELEASE OF LEGAL-SIZED FISH ON RECREATIONAL FISHERIES. *Mich. Dep. Nat. Resour. Fish. Res. Rep. No. 1903*. 23p. 1982. SFA 30(4)

Catching and releasing fish, even though they may be of legal size to keep under prevailing fishing laws, is a widespread practice among recreational fishermen. However, fisheries managers usually concentrate on estimating fishing effort and number of fish harvested when assessing a fishery, and simply assume that the impact of this voluntary release of legal fish is negligible. The purpose of this study was to examine how the release of legal fish might affect a fishery. The approach was to develop a general population dynamics model for addressing voluntary release and to use the model to study its impact on four fisheries with widely different characteristics of growth, mortality, and fishing: a brook trout (*Salvelinus fontinalis*) fishery in a small stream, a largemouth bass (*Micropterus salmoides*) fishery in a 400-ha reservoir, a brown trout (*Salmo trutta*) fishery in a 30-m-wide river, and a northern pike (*Esox lucius*) fishery in a typical lake. Results for all four fisheries were similar in showing that the voluntary release of fish can have a substantial impact on a fishery if more than 10% of the legal fish caught are released. By altering the effective fishing mortality rate, it caused changes in fishery statistics to occur even though fishing effort and catch rate remained constant. More field studies are needed to understand the nature and extent of voluntary release of legal fish. Also, fisheries managers need to estimate voluntary release of fish, along with harvest and fishing effort, if they want to assess a fishery accurately.

85-003720 Clark, R. D., Jr. and G. R. Alexander. EFFECTS OF A SLOTTED SIZE LIMIT ON THE BROWN TROUT FISHERY OF THE AU SABLE RIVER, MICHIGAN. *Mich. Dep. Nat. Resour. Fish. Res. Rep. No. 1927*. 32p. 1984. SFA 30(4)

Fishing regulations for brown trout were changed from a 12-inch minimum to a slotted size limit. The slotted limit allowed harvest of trout between 8 and 12 inches and over 16 inches. Abundance of brown trout smaller than 8 inches decreased by 8%, abundance of 8- to 12-inch brown trout decreased by 32%, and the abundance of brown trout over 12-inches decreased by 47%. Growth rate did not change significantly. Annual fishing mortality rate between ages 2 and 3 increased from near zero to about 30%, and this reduced the number of fish surviving to older ages and larger sizes. However, unfavorable changes in environmental conditions contributed to decreases in abundance also. Total numerical harvest of brown trout increased nearly five times but consisted of smaller fish. Fishing pressure probably increased somewhat, but the increase in harvest was due primarily to the change in size limits. Voluntary release of legal-sized trout appeared to increase independent of our regulations. We concluded that the greatest effect of the slotted limit was in reshaping man's use of the trout populations. Biological effects were comparatively unimportant except for their influence on satisfying desires of different factions within the angling community.

85-003721 Gabelhouse, D. SLOT LENGTH LIMITS: AN OVERVIEW. *Kans. Wildl. 42*(5):22-25. 1985. SFA 30(4)

MARKING AND TAGGING

85-003722 Carrier, J. C. NURSE SHARKS OF BIG PINE KEY: COMPARATIVE SUCCESS OF THREE TYPES OF EXTERNAL TAGS. *Fla. Sci.* 48(3):146-154. 1985. SFA 30(4)

[Dep. Biol., Albion Coll., Albion, MI 49224] Seventy nurse sharks (*Ginglymostoma cirratum*) were tagged and released from Big Pine Key, Florida with combinations of stainless steel barbed tags, plastic barbed tags, and modified Carlin disc tags. Twenty percent of the tagged sharks were recovered; 35% of the animals tagged with only stainless steel barbed tags were recovered; 21% of those tagged with both plastic barbed tags and

SPORT FISHERY ABSTRACTS

MARKING AND TAGGING (CONTINUED)

85-003722 CONTINUED Carlin disc tags were recovered. Disc tags remained in place more frequently than plastic barbed tags, but showed significant damage to tagged animals over time when applied to juvenile animals.

85-003723 Chisholm, I. M. and W. A. Hubert. EXPULSION OF DUMMY TRANSMITTERS BY RAINBOW TROUT. *Trans. Am. Fish. Soc.* 114(5):766-767. 1985. SFA 30(4)
[Wyo. Coop. Fish. Wildl. Res. Unit, Dep. Zool. Physiol., Univ. Wyo., Laramie 82071]

85-003724 Davies, D. H. and L. S. Joubert. TAG EVALUATION AND SHARK TAGGING IN SOUTH AFRICAN WATERS. *S. Afr. Assoc. Mar. Biol. Res. Oceanogr. Res. Inst. Invest. Rep. No. 12.* 36p. 1966. SFA 30(4)

85-003725 L'Abée-Lund and L. A. Vøllestad. DIFFERENTIAL MORTALITY RATES OF FIN-CLIPPED AND CARLIN-TAGGED ROACH (*Rutilus rutilus* L.). *J. Appl. Ichthyol.* 1(2):85-87. 1985. In English with French and German summ. SFA 30(4)
[Dep. Biol., Div. Gen. Physiol., P.O. Box 1051, Blindern, N-0316 Oslo 3, Norway] Roach were marked by fin-clipping (N=15888) or tagged with Carlin-tags (N=1476) during their spawning migration in two tributaries to Lake Årungen, Norway, in 1980. A total of 1746 of these roach were recaptured during spawning in 1981. The recapture rate of fin-clipped roach was significantly higher than the recapture rate of Carlin-tagged roach, probably due to differential mortality rates.

85-003726 Pedersen, B. H. and N. G. Andersen. A SURGICAL METHOD FOR IMPLANTING TRANSMITTERS WITH SENSORS INTO THE BODY CAVITY OF COD (*GADUS MORHUA* L.). *Dana* 5:55-62. 1985. SFA 30(4)
[Danish Inst. Fish. Mar. Res., Charlottenlund Castle, DK-2920 Charlottenlund, Denmark]

85-003727 Pincock, D. G. (ed.). FOURTH INTERNATIONAL CONFERENCE ON WILDLIFE BIOTELEMETRY. *Proc. Int. Cong. Wildl. Telemetry* 4:iv + 364p. 1983. A collection of papers.--RS. SFA 30(4)

STOCKING AND INTRODUCTIONS

85-003728 Beyerle, G. B. SURVIVAL AND GROWTH OF 5-, 10-, AND 15-CM WALLEYE FINGERLINGS STOCKED IN PONDS WITH BLUEGILLS. *Mich. Dep. Nat. Resour. Fish. Res. Rep. No. 1910.* 10p. 1983. SFA 30(4)

Over a period of 6 years walleye fingerlings of 5, 10, and 15 cm were planted in three ponds with bluegills so that each size of fingerling had a chance to survive and grow for 2 years in each pond. Percent survival and final mean length of the walleyes were not related to size at planting. Variations in forage density seemed to be more important than fingerling size in determining survival of walleyes. Apparently small fingerling walleyes (5 cm) will survive as well as larger fingerling when forage density is adequate and predators are absent.

85-003729 Beyerle, G. B. COMPARATIVE SURVIVAL OF PELLET-REARED TIGER MUSKELLUNGE STOCKED AS FINGERLINGS IN BLUEGILL PONDS WITH AND WITHOUT LARGE MOUTH BASS. *Mich. Dep. Nat. Resour. Fish. Res. Rep. No. 1920.*

STOCKING AND INTRODUCTIONS (CONTINUED)

85-003729 CONTINUED 1984. SFA 30(4)

For three consecutive years, 5.7- to 6.5-inch tiger muskellunge fingerlings were stocked at the rate of 10 per acre in four 3.0- to 4.0-acre ponds. The ponds contained either forage fish only (mainly bluegills) or forage fish and adult largemouth bass (9.0 inches and larger). Survival of the muskellunge was inversely correlated to the density of largemouth bass 12.0 inches and larger in length. The effects of predator density on survival dominated and masked the effects of forage density. Survival of fingerling muskellunge stocked in lakes with known densities of 12.0-inch and larger largemouth bass is predicted.

85-003730 Emery, L. REVIEW OF FISH SPECIES INTRODUCED INTO THE GREAT LAKES, 1819-1974. *Great Lakes Fish. Comm: Tech. Rep. No. 45*. 31p. 1985. SFA 30(4)

[U.S. FWS, Div. Prog. Oper. Fish., Washington, DC 20240] This review is based on an extensive literature search, combined with updated information obtained from biologists, and unpublished reports from private, state and federal organizations throughout the Great Lakes basin. The chronological review lists 34 species of fishes in 13 families that were introduced into the basin from 1819 to 1974. The Salmonidae and Cyprinidae are best represented, contributing 14 and 5 of the species, respectively. The list is divided into successful and unsuccessful introductions; each species is described and information about its entry into the basin and present status is given. About half of the introductions have been successful (i.e., the fish have reproduced and created viable, self-sustaining populations). Some of the successful introductions were disastrous in terms of damage inflicted on native populations (e.g., the effect of the sea lamprey, *Petromyzon marinus*, on populations of lake trout, *Salvelinus namaycush*, and lake whitefish, *Coregonus clupeaformis*), but others yielded highly favorable results (e.g., the extraordinary sport fisheries created by introductions of coho salmon, *Oncorhynchus kisutch*, and chinook salmon, *Oncorhynchus tshawytscha*).

85-003731 Mayama, H.; K. Ohkuma; T. Nomura and K. Matsumura. EXPERIMENTAL RELEASE OF MASU SALMON, *ONCORHYNCHUS MASOU*, SMOLTS INTO THE SHIRIBETSU RIVER. ADULT RETURNS OF MARKED FISH RELEASED IN THE SPRING OF 1981. *Sci. Rep. Hokkaido Salmon Hatchery No. 39*. p. 1-16. 1985. In Japanese with English summ. SFA 30(4)

[Hokkaido Salmon Hatchery, Fish. Agency, 2-2 Nakanoshima, Toyohira-ku, Sapporo 062, Japan]

85-003732 Nagata, M.; H. Tonosaki; M. Miyamoto; H. Kawamura and K. Watanabe. [TAGGING LIBERATION OF FRY FROM ADULT CHUM SALMON CAPTURED IN THE EASTERN HIDAKA COASTAL SEA - II. RETURNS OF ADULTS IN THE 1978 YEAR CLASS.] *Sci. Rep. Hokkaido Fish Hatchery No. 39*. p. 47-54. 1984. In Japanese with English summ. SFA 30(4)

[Hokkaido Fish Hatchery, Hokkaido, Japan]

85-003733 Nagata, M.; M. Miyamoto and H. Tonosaki. [POPULATION DYNAMICS OF THE POND-CULTURED JUVENILE MASU SALMON, *ONCORHYNCHUS MASOU* (BREVOORT), RELEASED INTO THE STREAM.] *Sci. Rep. Hokkaido Fish Hatchery No. 39*. p. 1-17. 1984. In Japanese with English summ. SFA 30(4)

[Hokkaido Fish Hatchery, Hokkaido, Japan]

85-003734 Sakamoto, H.; H. Kawamura and H. Tanaka. [PRELIMINARY OBSERVATIONS OF GROWTH AND RETURN OF POND-CULTURED MASU SALMON (*ONCORHYNCHUS MASOU*).] *Sci. Rep. Hokkaido Fish Hatchery No. 39*. p. 105-111. 1984. In Japanese with English summ. SFA 30(4)

[Hokkaido Fish Hatchery, Hokkaido, Japan]

FISHING GEAR AND TECHNIQUES

85-003735 Asano, K. SYSTEMATIC MODEL EXPERIMENTS ON THE 6.5 GT COASTAL FISHING BOAT. *Bull. Fac. Fish. Hokkaido Univ.* 36(1):35-49. 1985. In Japanese with English summ. SFA 30(4)

[Lab. Eng. Fish. Boat, Fac. Fish., Hokkaido Univ., Japan]

85-003736 Chang, J. W. A STUDY OF CIRCULATING WATER CHANNEL. *Bull. Kor. Fish. Soc.* 18(1):8-14. 1985. From Korean Sci. Abstr. 17(2):99. 1985. SFA 30(4)

85-003737 Hamley, J. M. and T. P. Howley. FACTORS AFFECTING VARIABILITY OF TRAPNET CATCHES. *Can. J. Fish. Aquatic Sci.* 42(6):1079-1087. 1985. In English with French summ. SFA 30(4)

[Dep. Biomet., Fac. Dent., Univ. Toronto, 124 Edward St., Toronto, ON M5G 1G6, Canada]

85-003738 Hubert, W. A. and D. N. Schmitt. SUMMER AND FALL HOOP NET CATCHES OF FISH IN THE UPPER MISSISSIPPI RIVER. *Iowa State J. Res.* 60(1):39-50. 1985. SFA 30(4)

[Wyo. Coop. Fish. Wildl. Res. Unit, Univ. Wyo., Laramie 82071] Catch patterns and length frequencies are described for 12 species caught in two types of hoop nets during summer and fall in channel habitats of the Upper Mississippi River. The catch of six species appeared to be influenced by unpredictable environmental variables such as current velocity and turbidity.. Four species exhibited catch patterns associated with seasonal changes in water temperature. Size selectivity of the two gear types was documented for 12 species.

85-003739 Kim, D. A STUDY FOR DESIGNING THE ZONAL CANVAS TYPE OF STOW NET. *Bull. Kor. Fish. Soc.* 18(1):1-17. 1985. From Korean Sci. Abstr. 17(2):99. 1985. SFA 30(4)

85-003740 McIvor, C. C. and W. E. Odum. USE OF FLUMES FOR SAMPLING FISHES AND MACROCRUSTACEANS ON MARSH SURFACES. *Estuaries* 8(2B):75A. 1985. Abstract only. SFA 30(4)

[Univ. Va., Charlottesville 22903]

85-003741 Miura, T.; S. Shimizu and S. Nishiyama. [THE ANALYSIS OF LURE VIBRATION.] *Bull. Jpn. Soc. Sci. Fish.* 51(5):699-706. 1985. In Japanese with English summ. SFA 30(4)

[Fac. Fish., Hokkaido Univ., Hakodate 041, Japan]

85-003742 Nashimoto, K. and O. Sato. LAMPREY FISH POTS USED IN THE ISHIKARI RIVER. *Bull. Fac. Fish. Hokkaido Univ.* 36(1):28-34. 1985. In Japanese with English summ. SFA 30(4)

[Lab. Fish. Gear Eng., Fac. Fish., Hokkaido Univ., Japan]

85-003743 Wallace, L. REACTIONS OF THE SHARKS *CARCHARHINUS LEUCAS* MÜLLER & HENLE) AND *ODONTASPIS TAURUS* (RAFINESQUE) TO GILL NET BARRIERS UNDER EXPERIMENTAL CONDITIONS. *S. Afr. Assoc. Mar. Biol. Res. Inst. Invest. Rep.* No. 30. 24p. 1972. SFA 30(4)

FERTILIZATION OF SOIL AND WATER

85-003744 Shankar, K. M. and T. J. Verghese. EVALUATION OF A COMBINATION OF SEWAGE SLUDGE AND SUPERPHOSPHATE FOR POND FERTILISATION. *Mysore J. Agric. Sci.* 17(3):267-272. 1983. SFA 30(4)

[Univ. Agric. Sci., Coll. Fish., Mangalore, India]

FERTILIZATION OF SOIL AND WATER (CONTINUED)

85-003745 Wright, R. F. CHEMISTRY OF LAKE HOVVATN, NORWAY, FOLLOWING LIMING AND REACIDIFICATION. *Can. J. Fish. Aquatic Sci.* 42(6):1103-1113. 1985. In English with French summ. SFA 30(4)
[Norwegian Inst. Water Res., P.O. Box 333, Blindern, 0314 Oslo 3, Norway]

FISHWAYS, FISH PASSAGE THROUGH DAMS, ETC.

85-003746 Fletcher, R. I. RISK ANALYSIS FOR FISH DIVERSION EXPERIMENTS: PUMPED INTAKE SYSTEMS. *Trans. Am. Fish. Soc.* 114(5):652-694. 1985. SFA 30(4)
[Great Salt Bay Exp. Stn., Damariscotta, ME 04543]

85-003747 McKinnon, G. A. and F. N. Hnytka. FISH PASSAGE ASSESSMENT OF CULVERTS CONSTRUCTED TO SIMULATE STREAM CONDITIONS ON LIARD RIVER TRIBUTARIES. *Can. Tech. Rep. Fish. Aquatic Sci.* No. 1255. vi + 121p. 1985. In English with French summ. SFA 30(4)
[Dep. Fish. Oceans, Winnipeg, MB R3T 2N6, Canada]

MATHEMATICS, STATISTICAL METHODS, AND MODELING

85-003748 Condrey, R. E. DENSITY-DEPENDENT SEARCHING TIME: IMPLICATIONS IN SURPLUS-PRODUCTION MODELS. *NOAA Fish. Bull.* 82(3):449-453. 1984. SFA 30(4)
[Cent. Wetland Resour., Coastal Ecol. Fish. Inst., La. State Univ., Baton Rouge 70803-7503]

85-003749 Elliott, J. M. THE CHOICE OF A STOCK-RECRUITMENT MODEL FOR MIGRATORY TROUT, *SALMO TRUTTA*, IN AN ENGLISH LAKE DISTRICT STREAM. *Arch. Hydrobiol.* 104(1):145-168. 1985. SFA 30(4)
[Freshwater Biol. Assoc., Windemere Lab., Ambleside, Cumbria LA22 0LP, England] After first considering different methods of presenting data on density dependence in populations, six stock-recruitment models for fish populations are described, and the problems of fitting and testing the models are discussed. Population-density data for the period 1966-83 are used to test the suitability of the six models for seven different stages in the life cycle of migratory trout in a stony stream. One two-parameter and two three-parameter models provide admissible solutions for all data sets, but only the two-parameter model (Ricker curve) provides significant fits for nearly all stages (six out of seven) in the life cycle.

85-003750 Gislason, H. and T. Helgason. SPECIES INTERACTION IN ASSESSMENT OF FISH STOCKS WITH SPECIAL APPLICATION TO THE NORTH SEA. *Dana* 5:1-44. 1985. SFA 30(4)
[Danish Inst. Fish. Mar. Res., Charlottenlund Castle, DK-2920 Charlottenlund, Denmark]

85-003751 Jensen, A. L. COMPARISON OF CATCH-CURVE METHODS FOR ESTIMATION OF MORTALITY. *Trans. Am. Fish. Soc.* 114(5):743-747. 1985. SFA 30(4)
[Sch. Nat. Resour., Univ. Mich., Ann Arbor 48109]

85-003752 Jones, R. ASSESSING THE EFFECTS OF CHANGES IN EXPLOITATION PATTERN USING LENGTH COMPOSITION DATA (WITH NOTES ON VPA AND COHORT ANALYSIS). *FAO Fish. Tech. Pap.* 256. x + 118p. 1984. SFA 30(4)
[DAFS Mar. Lab., Aberdeen, Scotland]

SPORT FISHERY ABSTRACTS

MATHEMATICS, STATISTICAL METHODS, AND MODELING (CONTINUED)

85-003753 Ludwig, D. and C. J. Walters. ARE AGE-STRUCTURED MODELS APPROPRIATE FOR CATCH-EFFORT DATA? *Can. J. Fish. Aquatic Sci.* 42(6):1066-1072. 1985. In English with French summ. SFA 30(4)
[Inst. Anim. Resour. Ecol., Univ. British Columbia, Vancouver, BC V6T 1W5, Canada]

85-003754 Millard, S. P.; J. R. Yearsley and D. P. Lettenmaier. SPACE-TIME CORRELATION AND ITS EFFECTS ON METHODS FOR DETECTING AQUATIC ECOLOGICAL CHANGE. *Can. J. Fish. Aquatic Sci.* 42(8):1391-1400. 1985. In English with French summ. SFA 30(4)
[Cent. Quant. Sci. For. Fish. Wildl., HR-20, Univ. Wash., Seattle 98105]

85-003755 Quinn, T. J. II. CATCH-PER-UNIT-EFFORT: A STATISTICAL MODEL FOR PACIFIC HALIBUT (*HIPPOGLOSSUS STENOLEPIS*). *Can. J. Fish. Aquatic Sci.* 42(8):1423-1429. 1985. In English with French summ. SFA 30(4)
[Int. Pac. Halibut Comm., P.O. Box 95009, Seattle, WA 98145-2009]

85-003756 Ruppert, D.; R. L. Reish; R. B. Deriso and R. J. Carroll. A STOCHASTIC POPULATION MODEL FOR MANAGING THE ATLANTIC MENHADEN (*BREVOORTIA TYRANNUS*) FISHERY AND ASSESSING MANAGERIAL RISKS. *Can. J. Fish. Aquatic Sci.* 42(8):1371-1379. 1985. In English with French summ. SFA 30(4)
[Dep. Stat., Univ. N. C., Chapel Hill 27514]

LAKE MANAGEMENT AND RESEARCH

85-003757 Busiahn, T. R. IMPLICATIONS OF FISH COMMUNITY CHANGES FOR FISHERY MANAGEMENT ON THE GREAT LAKES. *Great Lakes Fish. Comm. Spec. Publ.* 85-3. p. 77-83. 1985. SFA 30(4)
[Great Lakes Indian Fish Wildl. Comm., Odanah, WI 54861]

85-003758 Clark, R. D., Jr. and B. Huang. THE DYNAMICS OF COMPETITION BETWEEN SPORT AND COMMERCIAL FISHING: EFFECTS ON REHABILITATION OF LAKE TROUT IN LAKE MICHIGAN. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1909 62p. 1983. SFA 30(4)

85-003759 Kitchell, J. F. AN ECOLOGICAL RATIONALE FOR MANAGING PREDATOR-PREY SYSTEMS IN THE GREAT LAKES. *Great Lakes Fish. Comm. Spec. Publ.* 85-3. p. 85-97. 1985. SFA 30(4)
[Cent. Limnol., Univ. Wis., Madison 53706]

85-003760 Lorantas, R. M. ASSESSMENT OF THE CHANNEL CATFISH FISHERY IN SAGINAW BAY, LAKE HURON. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1908. 70p. 1982. SFA 30(4)

Channel catfish *Ictalurus punctatus* ranked second in weight harvested by commercial fishermen (231,000 kg), and third in number caught by sportfishermen (60,000) in Saginaw Bay in 1981. The commercial fishery employs trap nets, seines, and set hooks. Mean annual catch per unit effort for all gear types has increased in the past decade, in comparison to prior decades, and has lead commercial fishermen to request licensing of additoinal gear. The commerical fishery was assessed using a dynamic pool model, and an extension of the model was used to investigate the dynamics of gear competition. Growth and total mortality parameters, estimated from four management areas, were pooled for model analysis since no significant differences in these vital statistics were detected after the age of complete recruitment to the fishery. Parameters of the von Betalanffy

SPORT FISHERY ABSTRACTS

LAKE MANAGEMENT AND RESEARCH (CONTINUED)

85-003760 CONTINUED growth equation were estimated using mean back-calculated lengths at age derived from fin spine sections. Total instantaneous mortality was estimated from the slope of the descending limb of a catch curve. Fishing mortalities for each commercial gear type and for sportfishing gear were estimated by partitioning the total fishing mortality in proportion to the catch from that gear. Pooling all areas yielded a von Bertalanffy equation of the form $L_x = 921(1 - e^{(-0.09(x-0.35))})$, and a total instantaneous mortality of 0.67. Model predictions indicated that yield to the commercial fishery and to the sport fishery could be increased by increasing the minimum commercial size limit and/or reducing the commercial fishing mortality. Simulations also indicated that an increase in fishing mortality by any one gear type increased yield to the gear type, but reduced yield to all other gear types. The tenuous nature of the estimates of sportfishing mortality and natural mortality preclude specific management recommendations.

85-003761 Paine, J. R. and R. E. Lange. EFFECTING A POLICY: INSTITUTIONAL ARRANGEMENTS FOR ALLOCATING THE RESOURCE. *Great Lakes Fish. Comm. Spec. Publ.* 85-3. p. 119-123. 1985. SFA 30(4)
[Ontario Minist. Nat. Resour., Lake Erie Fish. Assess. Unit, Wheatley, ON NOP 2P0, Canada]

85-003762 Schneider, J. C. EXPERIMENTAL WALLEYE-PERCH MANAGEMENT IN A SMALL LAKE. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1905. 30p. 1983. SFA 30(4)

The experimental walleye-yellow perch community of Jewett Lake was subjected to public angling in 1979-82. The characteristics of the fishery and of the fish populations were monitored and compared to modeled responses. Fishing quality was on a par with other relatively low-yield coolwater fisheries. Anglers were able to harvest only 1.3-3.8 walleyes per hectare per year, far short of the quota of 7.0 which had been allotted in the model. Exploitation rate was 8.9% and natural mortality was 9-19%. Anglers took 50.5-64.0 perch per hectare per year in 1979-81, but harvest dropped to 11.6 in 1982. Only about 6% of the perch died from fishing, but this rate may have been excessive because natural mortality was very high, 88% per year. Apparently, high mortality of both juvenile and adult perch was due to walleye predation. Compared to model predictions, rates of walleye fishing and natural mortality were low, resulting in a high standing crop, slow growth, and excessive predation on perch. The perch population was turning over too rapidly but will probably recover as dominant year classes of planted walleyes are gradually replaced by smaller classes of native walleyes. The community could have supported higher densities of planktivores and benthivores.

85-003763 Sutton, K. THE DEATH AND REBIRTH OF LAKE CHICOT. *Ark. Game Fish* 16(5):5-9. 1985. SFA 30(4)

85-003764 Taub, F. B. LAKES AND RESERVOIRS. *Ecosystems of the World* 23:iv + 644p. 1984. A collection of papers.--RS Available at \$180.00 from Elsevier Sci. Publ. Co. Inc., P.O. Box 1663, Grand Central Station, New York 10163. SFA 30(4)

RIVER AND STREAM MANAGEMENT AND RESEARCH

85-003765 Alexander, G. R. and E. A. Hansen. SAND SEDIMENTS IN A MICHIGAN TROUT STREAM. PART II. EFFECTS OF REDUCING SAND BEDLOAD ON A TROUT POPULATION. *Mich. Dep Nat. Resour. Fish. Res. Rep.* No. 1902. 20p. 1982.

SPORT FISHERY ABSTRACTS

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

85-003765 CONTINUED SFA 30(4)

A sediment basin excavated in a Michigan trout stream reduced sand bedload sediment by 86% (from 56 ppm down to 8 ppm). Following the reduction in bedload, trout numbers increased significantly. Small or young trout increased about 40% throughout the treated area. Larger and older trout increased in the portion of the treated area that had an erodible sand bed. Although production increased 28%, growth rate of trout changed little. Both brown and rainbow trout populations responded similarly to the bedload reduction. However, statistical tests were more conclusive for brown trout than for rainbow trout due to lower year-to-year variation of the brown trout population. The results suggest that in-stream sediment basins are an effective means for removing sand bedload and that even small amounts of moving sand bedload sediments can have a major impact on a trout population.

85-003766 Alexander, G. R. and E. A. Hansen. EFFECTS OF SAND BEDLOAD SEDIMENT ON A BROOK TROUT POPULATION. *Mich. Dep. Nat. Resour. Fish. Res. Rep.* No. 1906. 50p. 1983. SFA 30(4)

An experimental introduction of sand sediment in Hunt Creek to increase the bedload 4 to 5 fold resulted in a significant reduction of trout and trout habitat. The trout population declined to less than half its normal abundance. The growth rate of individual trout was not affected. Population adjustment to the poorer habitat was via a decrease in the trout survival rates, particularly from the egg to fry and/or the fry to fall fingerling stage of the life cycle. Habitat for trout and trout food organisms became much poorer judged upon their drastic population reduction. Stream morphometry changed considerably with the channel widening and shallowing. Further, sand deposition aggradated the streambed and eliminated most pools. The channel became a continuous run, rather than a series of pools and riffles. Water velocities increased as did summer water temperatures. Relatively small bedload sediment concentrations of 80 to 100 ppm have a profound effect on trout and trout habitat.

85-003767 Brandes, K. OPPORTUNITIES TO PROTECT INSTREAM FLOWS IN IDAHO, OREGON, AND WASHINGTON. *U.S. Fish Wildl. Serv. Biol. Rep.* 85(9):xxi + 103p. 1985. SFA 30(4)

[U.S. FWS, Drake Creekside Bldg. One, 2627 Redwing Rd., Fort Collins, CO 80526]

85-003768 Cobb, S. P.; C. H. Pennington; J. A. Baker and J. E. Scott. FISHERY AND ECOLOGICAL INVESTIGATIONS OF MAIN STEM LEVEE BORROW PITS ALONG THE LOWER MISSISSIPPI RIVER. *U.S. Army Corps Eng. Miss. River Comm. Rep.* 1. 93p. 1984. SFA 30(4)

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85-003769 Cordiviola de Yuan, E. and C. Pignalberi de Hassan. FISH POPULATIONS IN THE PARANÁ RIVER LENTIC ENVIRONMENTS OF DIAMANTE AND SAN PEDRO AREAS (ARGENTINE REPUBLIC). *Hydrobiologia* 127(3):213-218. 1985. SFA 30(4)

[CONICET, Macia 1933, 3016 Santo Tome, Santa Fe, Argentina]

85-003770 Ertl, D. OPPORTUNITIES TO PROTECT INSTREAM FLOWS IN MAINE. *U.S. Fish Wildl. Serv. Biol. Rep.* 85(10):vi + 35p. 1985. SFA 30(4)

[U.S. FWS, WELUT, 2627 Redwing Rd., Fort Collins, CO 80526-2899]

85-003771 Hansen, E. A.; G. R. Alexander and W. H. Dunn. SAND SEDIMENTS IN A MICHIGAN TROUT STREAM. PART I. IN-STREAM SEDIMENT BASIN: A TECHNIQUE FOR REMOVING SAND BEDLOAD FROM STREAMS. *Mich. Dep. Nat. Resour. Fish.*

SPORT FISHERY ABSTRACTS

RIVER AND STREAM MANAGEMENT AND RESEARCH (CONTINUED)

85-003771 CONTINUED *Res. Rep. No. 1901. 26p. 1982. SFA 30(4)*

Erosion control techniques such as streambank stabilization and revegetation of eroding upland areas reduce only part of a stream's sediment load. This study demonstrated that an in-stream sediment basin can trap and remove almost all sand bedload sediments. Other advantages of sediment basins are that they can: 1) produce streambed downcutting to create deeper pools and improve streambed composition, and 2) keep critical spawning areas relatively free of sediment. Sediment basins should be used with caution in erodible bed streams that have no areas of erosion-resistant streambed to prevent possible excessive downcutting. Sediment basins can be added to the variety of techniques used to improve fish habitat, or they can be used alone to renovate sand-choked streams not amenable to the usual erosion control treatments.

85-003772 Haugen, G. N. STRATEGIES FOR RIPARIAN AREA MANAGEMENT. *Fisheries (Bull. Am. Fish. Soc.)* 10(4):20-21. 1985. SFA 30(4)

85-003773 Mahon, R. and E. K. Balon. FISH PRODUCTION IN WARMWATER STREAMS IN POLAND AND ONTARIO. *Can. J. Fish. Aquatic Sci.* 42(6):1211-1215. 1985. In English with French summ. SFA 30(4)

[Bedford Inst. Oceanogr., P.O. Box 1006, Dartmouth, NS B2Y 4A2, Canada]

85-003774 Marsh, J. H. and J. H. Johnson. THE ROLE OF STEVENS TREATY TRIBES IN THE MANAGEMENT OF ANADROMOUS FISH RUNS IN THE COLUMBIA BASIN. *Fisheries (Bull. Am. Fish. Soc.)* 10(4):2-5. 1985. SFA 30(4)

[Northwest Power Planning Council, Portland, OR]

85-003775 Moyle, P. B. and D. M. Baltz. MICROHABITAT USE BY AN ASSEMBLAGE OF CALIFORNIA STREAM FISHES: DEVELOPING CRITERIA FOR INSTREAM FLOW DETERMINATIONS. *Trans. Am. Fish. Soc.* 114(5):695-704. 1985. SFA 30(4)

[Dep. Wildl. Fish. Biol., Univ. Calif., Davis 95616]

85-003776 Newton, J. FIFTEENMILE CREEK RIPARIAN RECOVERY, WASCO COUNTY, OREGON. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:80-83. 1984. SFA 30(4)

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85-003777 Scholl, D. K.; P. J. Peeters and S. T. Schram. MIGRATORY BROWN TROUT AND RAINBOW TROUT POPULATIONS OF THE BRULE RIVER, WISCONSIN. *Wis. Dep. Nat. Resour. Fish Manage. Rep. No. 123. 93p. 1984. SFA 30(4)*

85-003778 Winward, A. H. AN ECOSYSTEM CLASSIFICATION FOR INTERMOUNTAIN RIPARIAN AREAS. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:1-5. 1984. SFA 30(4)

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FARM POND AND SMALL IMPOUNDMENT MANAGEMENT AND RESEARCH

85-003779 Knighton, M. D., (compiler). WATER IMPOUNDMENTS FOR WILDLIFE: A HABITAT MANAGEMENT WORKSHOP. *U.S. For. Serv. North Cent. For. Exp. Stn. Gen. Tech. Rep. NC-100. 136p. 1985. A collection of papers.--RS SFA 30(4)*

SPORT FISHERY ABSTRACTS

FARM POND AND SMALL IMPOUNDMENT MANAGEMENT AND RESEARCH (CONTINUED)

85-003780 Poff, R. J. MANAGING WATERFOWL IMPOUNDMENTS FOR FISHERIES. *U.S. For. Serv. North Cent. For. Exp. Stn. Gen. Tech. Rep. NC-100*. p. 106-109. 1985. SFA 30(4)

LARGE IMPOUNDMENT MANAGEMENT AND RESEARCH

85-003781 Crawford, T. THE EFFECTS OF COMMERCIAL FISH REMOVAL, ON SPORT FISH POPULATIONS IN TWO ARKANSAS RESERVOIRS. *Proc. Ark. Acad. Sci.* 38:30-35. 1984. SFA 30(4)

[Ark. Game Fish Comm., Little Rock 72205] Commercial netting occurred October through April, 1971-1976 on Nimrod Lake and from October through April, 1973-1977 on Blue Mountain Lake in west central Arkansas. Using 7.6 cm or larger mesh gill and/or trammel nets, commercial fisherman harvested commercial fishes (buffalo fishes [*Ictiobus* spp.]; common carp [*Cyprinus carpio*]; carpsuckers [*Carpoides* spp.]; drum [*Aplodinotus grunniens*]; gars [*Lepisosteus* spp.]; suckers [*Catostomidae*]; and catfishes [*Ictalurus* spp. and *Pylodictis olivaris*]). During the study period, cove rotenone samples were conducted on an annual basis. Fishes collected were placed into age classes and enumerated. Data were then grouped into general categories (black basses [*Micropterus* spp.], crappie [*Pomoxis* spp.], sunfishes [*Lepomis* spp.], clupeid fishes [*Dorosoma* spp.], commercial fishes and catfishes) and analyzed. Substantial reductions in standing crops of commercial fishes were noted in both reservoirs. However, in Blue Mountain Lake, reductions were temporary and commercial fish biomasses had begun to increase markedly by the end of the study period. As catfishes were the species principally sought by commercial fishermen, it was somewhat surprising that total catfish biomasses increased in Blue Mountain Lake following the start of netting. For three of the four years prior to netting, catfish spawns were not recorded from Nimrod Lake. However, following the instigation of netting, spawns were recorded for the following four years. Sport fish populations for the most part were unharmed by the commercial netting. In some instances, sport fish populations appeared to improve during the study period. Visual analysis revealed that the increases in numerical standing crops of smaller sport fishes in Blue Mountain Lake appeared to correspond to decreases in commercial fish biomasses. Significant ($P \leq 0.05$) increases in sport fish young-of-the-year numbers were recorded for crappie in Blue Mountain Lake and sunfishes in Nimrod Lake and Blue Mountain Lake. Increases in numerical standing crops were also observed among intermediate black bass and crappie populations of both study lakes. Adult black bass mean numerical standing crops were virtually unchanged in both study lakes. Adult crappie and sunfish population exhibited some variation in the study. A small increase in the adult crappie population was observed in Nimrod Lake, while a significant increase ($P \leq 0.05$) in the adult sunfish population was noted in Nimrod Lake. In Blue Mountain Lake, an expansion of the forage base occurred which included an increase in the number of both adult and intermediate clupeid fishes present. Adult shad populations decreased in Nimrod Lake, while the numbers of young-of-the-year shad were lower in both study lakes. It was felt that the netting program contributed significantly to the increases in sport fish populations in both lakes. However, other uncontrollable factors may have also influenced the sport fish populations in the two lakes (i.e. winter and spring water levels).

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[GosNIORKh, Konakovo, Kalininskoy Oblast, USSR]

ESTUARY MANAGEMENT AND RESEARCH

85-003783 Colby, D. R.; G. W. Thayer; W. F. Hettler and D. S. Peters. THE IMPACT OF ALTERATION OF FRESHWATER INFLOW PATTERNS ON FORAGE FISH COMMUNITIES IN THE TEN THOUSAND ISLANDS. REGIONS OF SOUTH FLORIDA. *Estuaries*

SPORT FISHERY ABSTRACTS

ESTUARY MANAGEMENT AND RESEARCH (CONTINUED)

85-003783 CONTINUED 8(2B):34A. 1985. Abstract only. SFA 30(4)
[NMFS, Beaufort, NC]

85-003784 Herke, W. H.; E. E. Knudsen; B. D. Rogers and V. L. Prenger. EFFECTS OF A FIXED-CREST WATER CONTROL STRUCTURE ON THE ABUNDANCE OF THE FISH AND CRUSTACEANS MIGRATING FROM A SHALLOW MARSH NURSERY TOWARD THE GULF OF MEXICO. *Estuaries* 8(2B):21A. 1985. Abstract only. SFA 30(4)
[La. State Univ., Baton Rouge]

85-003785 Ketchum, B. H. ESTUARIES AND ENCLOSED SEAS. *Ecosystems of the World* 26:xii + 500p. 1983. A collection of papers.--RS Available at \$153.00 from Elsevier Sci. Pub. Co. Inc., P.O. Box 1663, Grand Central Station, New York 10163. SFA 30(4)

85-003786 Middleton, M. J.; M. A. Rimmer and R. J. Williams. STRUCTURAL FLOOD MITIGATION WORKS AND ESTUARINE MANAGEMENT IN NEW SOUTH WALES - CASE STUDY OF THE MACLEAY RIVER. *Coastal Zone Manage.* 13(1):1-23. 1985. SFA 30(4)
[Div. Fish., Dep. Agric., Sydney, NSW, Australia]

85-003787 Schooley, J. K. SPATIAL AND TEMPORAL HETEROGENEITY OF FISH HABITATS IN FLORIDA'S INDIAN RIVER LAGOON. *Estuaries* 8(2B):35A. 1985. Abstract only. SFA 30(4)
[Eckerd Coll., St. Petersburg, FL]

MARINE MANAGEMENT AND RESEARCH

85-003788 Bigford, T. E. NORTHEAST FISHERIES HABITAT PRIORITIES IN COASTAL AND ESTUARINE WATERS. *Estuaries* 8(2B):50A. 1985. Abstract only. SFA 30(4)
[NMFS, Gloucester, MA]

85-003789 FAO of the UN. INDO-PACIFIC FISHERY COMMISSION (IPFC) REPORT OF THE FOURTH SESSION OF THE STANDING COMMITTEE ON RESOURCES RESEARCH AND DEVELOPMENT. JAKARTA, INDONESIA, 23-29 AUGUST 1984. *FAO Fish. Rep.* No. 318. vi + 108p. 1984. SFA 30(4)
[Rome, Italy]

85-003790 FAO of the UN. REGIONAL COMPENDIUM OF FISHERIES LEGISLATION (WESTERN PACIFIC REGION). *FAO Legislative Study* No. 35. v + 971p. 1984. (2 vol.). SFA 30(4)
[Rome, Italy]

85-003791 FAO of the UN. REPORT OF THE THIRD SESSION OF THE COMMITTEE FOR THE DEVELOPMENT AND MANAGEMENT OF FISHERIES IN THE SOUTHWEST INDIAN OCEAN. MOMBASA, KENYA, 14-16 NOVEMBER 1984. *FAO Fish Rep.* No. 320. vi + 36p. 1984. SFA 30(4)
[Rome, Italy]

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SPORT FISHERY ABSTRACTS

MARINE MANAGEMENT AND RESEARCH (CONTINUED)

85-003793 FAO of the UN. REPORT OF THE SEVENTH SESSION OF THE WORKING PARTY ON RESOURCES EVALUATION. *FAO Fish. Rep.* No. 313. vii + 57p. 1984. SFA 30(4)
[Rome, Italy]

85-003794 Iwasaki, Y. [RELATIONSHIP BETWEEN THE PURSE SEINE FISHING CONDITIONS OF BLUEFIN TUNA AND YELLOWFIN TUNA AND FLUCTUATIONS OF SEA CONDITION IN THE KINAN AND IZU REGIONS, PACIFIC COAST OF JAPAN.] *Bull. Jpn. Soc. Fish. Oceanogr.* 45:3-9. 1984. In Japanese. From *Fac. Mar. Sci. Technol. Tokai Univ. Collected Reprints* 14(58-59):155-161. 1985. SFA 30(4)
[Fac. Mar. Sci. Technol., Tokai Univ., Shimizu, Shizuoka 424, Japan]

85-003795 Jacobs, D. and R. E. Ulanowicz. SHORT-TERM FORECASTING OF COMMERCIAL FISH LANDINGS. *Estuaries* 8(2B):69A. 1985. Abstract only. SFA 30(4)
[Chesapeake Biol. Lab., Solomons, MD]

85-003796 Kovtun, I. F.; T. S. Bondarenko and Y. I. Rekov. CHARACTERISTICS OF THE AZOV STURGEON FISHERY. *J. Ichthyol. (Engl. Transl. Vopr. Ikhtiol.)* 24(6):119-124. 1984. SFA 30(4)
[AzNIRKh, Rostov-on-Don, USSR]

85-003797 Tambs-Lyche, H. and B. B. Parrish, (eds.). ANNALES BIOLOGIQUES. *Ann. Biol.* 39:1-209. 1984. A collection of papers.--R.S.

UTILIZATION OF FISHERY PRODUCTS

85-003798 Dunham, R. A.; J. A. Joyce; K. Bondari and S. P. Malvestuto. EVALUATION OF BODY CONFORMATION, COMPOSITION, AND DENSITY AS TRAITS FOR INDIRECT SELECTION FOR DRESS-OUT PERCENTAGE OF CHANNEL CATFISH. *Prog. Fish-Cult.* 47(3):169-175. 1985. SFA 30(4)
[Dep. Fish. Allied Aquacult., Ala. Agric. Exp. Stn., Auburn Univ., AL 36849]

85-003799 Tucker, J. W., Jr.; M. P. Landau and B. E. Faulkner. CULINARY VALUE AND COMPOSITION OF WILD AND CAPTIVE COMMON SNOOK, *CENTROPOMUS UNDECIMALIS*. *Fla. Sci.* 48(4):196-201. 1985. SFA 30(4)
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MISC. TECHNIQUES AND EQUIPMENT

85-003800 Bell, J. D.; A. S. Steffe and M. Westoby. ARTIFICIAL SEAGRASS: HOW USEFUL IS IT FOR FIELD EXPERIMENTS ON FISH AND MACROINVERTEBRATES? *J. Exp. Mar. Biol. Ecol.* 90(2):171-177. 1985. SFA 30(4)
[Sch. Biol. Sci., Macquarie Univ., North Ryde, N.S.W. 211, Australia]
Twenty-four artificial seagrass units (ASUs), each of 7m², were submerged near *Zostera capricorni* Aschers beds for 6 wk. Fish, decapods and cephalopods associated with ASUs and with comparable areas within adjacent *Zostera* beds were then collected. ASUs yielded significantly fewer species than *Zostera* areas but there was no significant difference in number of individuals. Relative abundances of species were similar in samples from ASUs and *Zostera*, and there were few significant differences in abundance of the seven major faunal groups. Our

MISC. TECHNIQUES AND EQUIPMENT (CONTINUED)

85-003800 CONTINUED interpretation of these data is that artificial seagrass attracts vagile macrofauna typical of real seagrass, that ASUs had fewer species than *Zostera* only because they had less time to accumulate species, and that ASUs should prove a valuable tool in field experiments on macrofaunal assemblages.

85-003801 Degnbol, P.; H. Lassen and K. Stoehr. *IN-SITU* DETERMINATION OF TARGET STRENGTH OF HERRING AND SPRAT AT 38 AND 120 KHZ. *Dana* 5:45-54. 1985. SFA 30(4)

[Danish Inst. Fish. Mar. Res., Charlottenlund Castle, DK-2920 Charlottenlund, Denmark]

85-003802 Elmore, W. and P. Cuplin. USE OF COLOR INFRARED PHOTOGRAPHY IN STREAM HABITAT INVENTORIES. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:6-12. 1984. SFA 30(4)

[Bur. Land Manage., 185 E. 48th St., Prineville, OR 97754]

85-003803 Environmental Research Institute of Michigan. PROCEEDINGS OF THE EIGHTEENTH INTERNATIONAL SYMPOSIUM ON REMOTE SENSING OF ENVIRONMENT. *Proc. Int. Symp. Remote Sens. Environ.* 18:200p. 1985(1985). (3 vol.). SFA 30(4)

85-003804 European Inland Fisheries Advisory Commission. EIFAC EXPERIMENTS OF PELAGIC FISH STOCK ASSESSMENT BY ACOUSTIC METHODS IN LAKE CONSTANCE. *EIFAC Occas. Pap.* No. 15. v + 14p. 1985. SFA 30(4)

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85-003805 Findley, J. RIPARIAN MONITORING USING LARGE SCALE COLOR INFRA-RED AERIAL PHOTOGRAPHY IN SOUTHEASTERN OREGON. *Proc. Pac. Northwest Range Manage. Short Course Range Watersheds Riparian Zones Econ.: Interrelation. Manage. Use* 1984:13-17. 1984. SFA 30(4)

[Bur. Land Manage., P.O. Box 700, Vale, OR 97918] Large scale color infra-red aerial photography is being used by the Bureau of Land Management in Vale, Oregon, to monitor effects of management on selected riparian habitat. Approximately 130 miles of stream have been photographed at a scale of 1:2000, with repeat photography to be acquired on a five to ten year cycle. Measurements are made to determine existing cover of perennial woody and herbaceous vegetation in the riparian zone. Changes in cover over time will determine subsequent management actions. Other measurements including bank and stream channel stability/instability also may be made.

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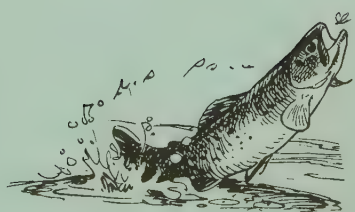
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